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THE PRESERVATION OF LOCAL TYPES OF WEAPONS AND OTHER OBJECTS IN WESTERN AUSTRALIA

By WILFRID D. HAMBLY

DURING recent years Field Museum has acquired by collection, exchange, and purchase, a large series of weapons and other objects from West Australia. As is so frequently the case, fuller data would be welcome, but fortunately the objects are well localized. This makes a study of local types possible, and in general there is a remarkable preservation of regional peculiarities in respect to size, shape, and design. It is not proposed to enter upon a detailed discussion of the psychological, climatic, and geographical factors that tend to perpetuate certain types, but such factors are deserving of mention because of their creation and preservation of types which may with a little practice be readily referred each to its own locality. A glance at maps dealing with distribution of rainfall indicates that aridity may to some extent account for isolation. Again there is a well known conservatism of human nature tending to place a check on borrowing.[1] In some areas the presence of particular woods is no doubt an incentive to the elaboration of shapes and patterns which are distinctly in advance of those from other localities not far away (see fig. 7, p. 13). Proximity to the coast must give ideas and stimulating contacts, as will also the presence of a railway line. Primitive barter of spears, etc., likewise the meeting for tribal ceremonies,[2] and visits to outcrops of red ochre[3] and quartzite,[4] must all tend toward the determination and elaboration of local types.

The evidence here submitted shows very conclusively a preservation

[1] D. S. Davidson, The Family Hunting Territory in Australia, AA, 30: 614, 1928, and A. R. Brown, JRAI, 43: 148, 151.

[2] B. Spencer and F. J. Gillen, Across Australia, 2: 470 (London), 1912.

[3] A. W. Howitt, Native Tribes of South East Australia, 712 (London), 1904.

[4] R. Brough Smyth, The Aborigines of Victoria, Warfare, 1–47 (London), 1878.

of local types. In the absence of detailed information relating to West Australian aborigines[5] the following descriptions and diagrams will no doubt be of practical use to ethnographers, especially those concerned with the classification and installation of material in museums.[6]

The principal places mentioned are: Kimberley (East and West);[7] Murchison (Lower and Central); Ashburton;[8] Kalgoorlie (Mount Margaret); Yilgarn; Pilbarra; and Broome (map 1).

In relation to these localities the following objects have been considered: yinmarries; whirlers; message sticks; spear-throwers; clubs; boomerangs; shields; spears.

All principal dimensions have been drawn to the scale mentioned on each diagram. The details of patterns are approximately to the same scale as the principal measurements. Fine lining and equidistant patterns would have been a misrepresentation of the objects. The crudity of drawing, where such exists, is an accurate representation of the coarseness of the actual workmanship.

Passports and Message Sticks from West Australia

All the examples in figure 1 are made from a hard yellow wood resembling boxwood in the fineness of grain. *a*, *b* are described as "passports." This term may be correctly used. While there is no definite information to justify its use in these instances, it is known that natives carry such sticks when obtaining stone from a region outside their own territory.[9] Bands of aborigines visit ouside their own territory to secure red ochre,

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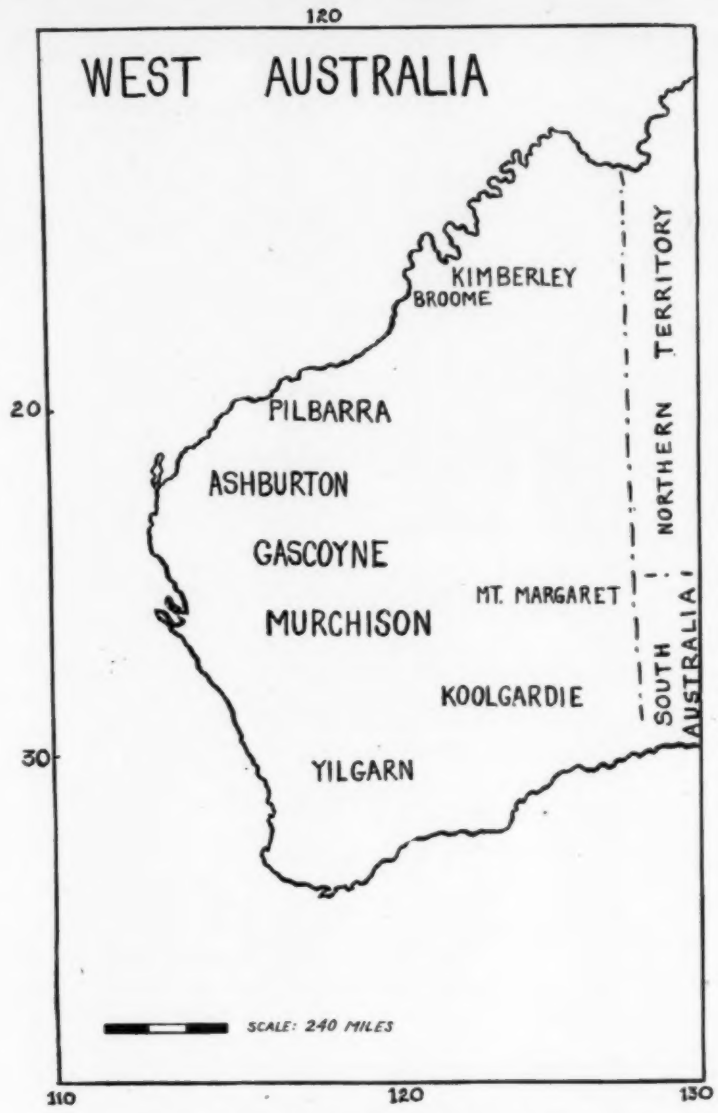
[5] H. Klaatsch, Schlussbericht über meine Reise nach Australien in den Jahren 1904–7, ZE, 39: 635, 690, 1907. Also Samuel Wake, Notes on the Aborigines of West Australia, Anthropologia, 88–90, 1876.

[6] Australian Museum Handbooks (Sydney). The illustrated catalogue of the Victoria Museum (Melbourne, 1922) contains illustrations of West Australian material. A. R. Brown, Three Tribes of West Australia, JRAI, 43: 143, 1913 (map, p. 193). E. Clement and J. D. E. Schmeltz, Ethnographical Notes on the West Australian Aborigines, IAE, v. 16, 1903. George Grey, Journals of Two Expeditions of Discovery in N. W. and Western Australia in the Years 1837–9, 2 vols. (London), 1841. L. A. D. Montague, Weapons and Implements of Savage Races (London), 1921.

[7] E. T. Hardman, Notes on a Collection of Native Weapons and Implements from Tropical Western Australia, Kimberley District, Proc. Roy. Irish Acad., 3rd ser., vol. 1, no. 1, 1888.

[8] E. M. Curr, The Australian Race, 1: 143 (Melbourne and London), 1886.

[9] R. Brough Smyth says that when one or two natives were selected for the purpose of procuring diorite, they carried with them credentials showing exactly their object. This account relates to Victoria.



MAP 1. Principal places mentioned in descriptions.

therefore some "passport" may be necessary. When calling groups to assemble for initiation or other ceremonies such sticks may be carried. The meaning of the details of design is unknown. The pattern on *g*, possibly also the designs on *e*, represent a snake. The snake plays an important part in some totemic and initiation ceremonies, while folk-lore is largely

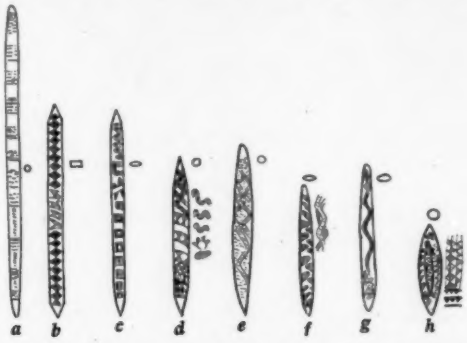


FIG. 1. Passports and message sticks from West Australia. Scale: 1/4.

concerned with snake-like monsters which inhabit water holes.[10] With the exception of *d*, *f*, *h* the designs are almost identical on both sides of the stick. The small drawings inset on the right of these drawings show the prevailing pattern on the reverse side. As indicated on figure 1, four of the sticks are round in cross-section, three are oval, and one is rectangular.

YINMARRIES, WHIRLERS, AND CHURINGA FROM WEST AUSTRALIA

The aborigines reserve their most painstaking efforts for the incised decoration of the whirlers and churinga (see fig. 2). The distinction between the two classes appears to be in the provision of a small round hole at the end of each whirler, which has a cord attached. The cord is, I believe, a mixture of finely shredded bark and native human hair.

Specimens shown as *a–c* in figure 2 are from Ashburton. All are plano-convex with well planned, incised decoration on the flat side only. *d* and *e* are churingas from Broome, typical of a collection of four. They are incised on one side only. *f* is a single example of a churinga from Kimberley which is liberally smeared with red ochre. The specimen has similar decoration on both sides. *j–n* are examples from Central Murchison. All

[10] A. R. Brown, Rainbow Snake Myths of Australia, JRAI, 56: 19, 1926.

are flat on one side and convex on the other. The incised lines are on the flat side only in each example. The wood is of a hard red variety which has had its natural color somewhat changed by applications of red ochre. *i* and

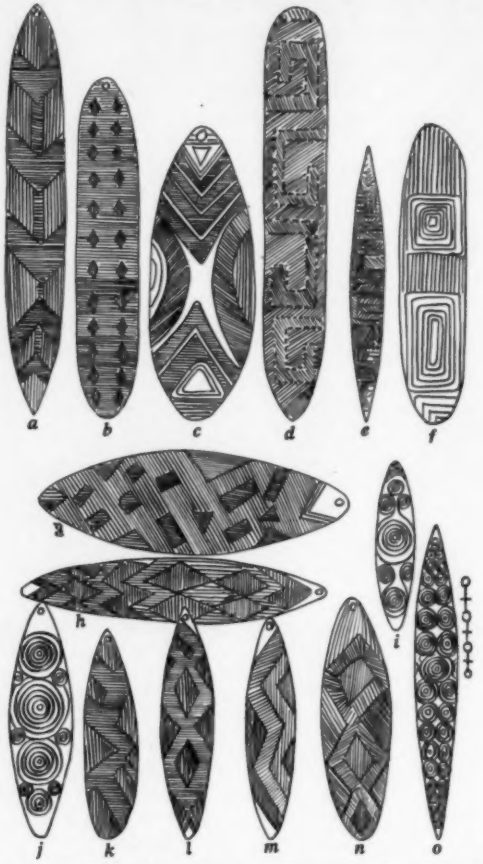


FIG. 2. Whirlers and churinga from West Australia. Scale: 1/2.

o are both whirlers from Mount Margaret, Kalgoorlie. The design is repeated on each side. The form is bi-convex. *g* and *h* are whirlers from Gascoyne river. The form is plano-convex with incised ornament on the flat side only. Both are made of hard red wood.

In connection with the churinga should be mentioned a number of "yinmarries," or "ceremonial slabs." The uses of the Australian churinga have been described by several authors; presumably the "yinmarrie" is employed in the same way. In the absence of definite information one surmises that the ceremonial slab is, like the churinga, hidden away in some place known only to the tribal elders. On ceremonial occasions the yinmarrie may be brought out and decorated, possibly with blood and feathers. An account of the ceremonial significance of these yinmarries would be a welcome addition to the Museum's data. These long oval slabs of dark reddish-brown wood are deeply incised with criss-cross lines like those shown on the bullroarers (whirlers), and churinga. The slabs, six in number, vary in length from 58 cm. to 78 cm. The yinmarries from Central Murchison are easily distinguishable, as their length in each case is about twice the length of the other Murchison types. The lengths of the yinmarries from Central Murchison are 156, 113, and 146 cm., respectively. The average breadth of the Murchison yinmarries is 7.5 cm. The examples of these so-called "sacred slabs," from Mount Margaret, Kalgoorlie, are particularly long and well incised. The general form is a long narrow oval with straight sides. The six examples vary in length from 247 cm. to 72 cm. The patterns are on the concave side only.

Spear-Throwers from West Australia

The Kimberley type shown as *a* in figure 3 is one of four almost identical specimens from that locality. The dimensions are 91, 96, 96, and 107 cm., thus indicating great uniformity of construction. The wood is very light in texture and shows a coarse open grain. The color is light brown. There is no decoration. The weapon is flat on both sides. The curved peg of semi-oval form is bound with gum and sinew, the latter being lashed round the middle of the peg, which is of wood. The tooth of a kangaroo does not appear to have been used in any of these examples and the sinew lashing passes round the curvature.

The type from Central and Lower Murchison (fig. 3*b*) is a long narrow pattern which might be described as oval except for the flattened sides. At the end which is gripped by the thrower there is a large oval mass of black gum. The side on which the peg is lashed is quite flat, while the reverse side is slightly convex. This is one of four examples of almost exactly the same lengths and breadths (74 cm.×6.5 cm.).

The Pilbarra, Ashburton type (fig. 3*c*) is one of four examples of uniform dimensions. The deeply incised patterns vary on different specimens,

as indicated by the small inset drawings to the right of *c*. Decoration is confined to the peg side, which is flat or very slightly concave.

The type from the Eastern District (fig. 3*d*) is made from a thin slab of hard red wood very like mahogany in grain and general appearance. The peg side is flat. The reverse side is slightly convex. Four examples are of almost identical measurement. No incised or other ornament is present.

Figure 3*e* is a type of eight examples from Mount Margaret, Kalgoorlie. The incised decorations are confined to the hook (peg) side, which in seven instances out of the eight is deeply concave. All are convex on the reverse

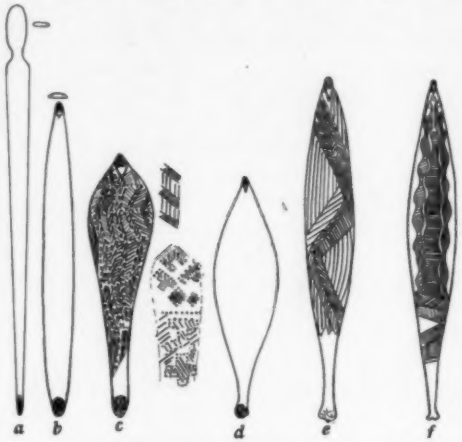


FIG. 3. Spear-throwers from West Australia. Scale: 1/5.

side. In all instances the pegs are bound with sinew, but in two instances there has been no addition of gum to cement the binding. Four of the specimens have a big lump of black gum at the grip. Four have a plain wooden finish, without the oval lump of gum found on the majority of spear-throwers, no matter what their general design may be. In the collection there are two examples from Lakeway, East Murchison, which conform very closely in all respects to *e* (Kalgoorlie type).

Figure 3*f* is said to be from the Murchison division, and is the best example of aboriginal art in the Museum's collection from West Australia. Usually the worker becomes confused in his attempts to carry out a design. Here, however, there was a clear concept of three snakes whose

heads are close together at the peg end of the thrower. The artist has been successful in creating an illusion. The observer may see either two very narrow snakes or three broad ones. The number of heads clearly indicates that the designer intended the pattern to represent three snakes. The incisions are very deeply cut in hard wood of a natural reddish brown color.

Boomerangs and Clubs from West Australia

The table (page 10) indicates the data used in preparation of figure 4. The measurements were made by laying each boomerang in turn on a sheet of white paper marked in square centimeters. By "curvature" is meant the height of the arch from the base line. In each case the height of the arch was measured, from the base line joining the tips, to the lower curve of the arch. The breadth is in each instance the maximum. In relation to curvature, length, and breadth, figures have been given to indicate the "range of measurements." There is, on the whole, great consistency within any given group. I do not possess sufficient skill to judge the respective powers of flight and returning qualities. So far as inspection may be trusted all are fighting boomerangs with the possible exception of *c*, *h*, *j*, *k*. Specimens *c* and *h* appear to have their halves in slightly different planes. *j* and *k* are quite flat, covered with red ochre, and painted crosswise with broad white stripes. Possibly the Museum catalogue correctly describes them as ceremonial. *k* shows the result of considering all the painted Kimberley boomerangs as one group. Inspection, verified by measurement, indicates that the twelve examples are divided into two groups with six examples in each. The principle of division is the height of the arch of curvature. Type B has a very high arch, while that of type A is considerably flatter. The group of nine boomerangs, marked "Kimberley" in the Museum catalogue, are undecorated. Their average form is indicated in *l*.

A large number (16) of clubs from Pilbarra, Ashburton, Gascoyne, and Murchison, are of very uniform construction and design. If these specimens were mingled, there would be great difficulty in resorting them. The length is almost invariably 70 cm., and the thickness 3 cm. The clubs are cylindrical in form and are fluted with deep incisions from the thicker end to the grip which is about 10 cm. long. A few irregular incisions are made to give a firm hold. Each of two such clubs from Central Murchison has a rounded quartzite chisel fixed into the end of the club with black gum. Two clubs from Yilgarn (S. E. of West Australia) conform to the general pattern. They are, however, distinguishable by their yellowish color and more slender form. Two clubs from East Kimberley are easily distin-

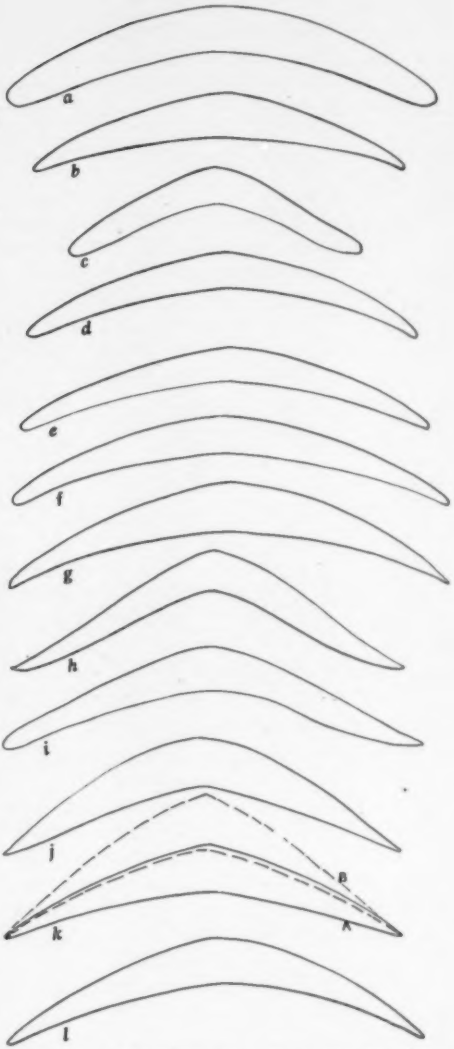


FIG. 4. Boomerangs from West Australia. *a*, Upper Murchison Gascoyne; *b*, Murchison, type A; *c*, Murchison, type B; *d*, Central Murchison; *e*, Lower Murchison; *f*, Ashburton; *g*, Broome; *h*, East York, Yilgarn; *i*, Mount Margaret, Kalgoorlie; *j*, Kimberley (decorated); *k*, Kimberley (types A and B—both decorated); *l*, Kimberley. Scale : 1/3.

District	No. of examples measured	Average curvature and range	Average length and range	Average breadth and range	Remarks
Upper Murchison Gascoyne	12	7.8 6.3–8.5	62.2 58–68	6.4 6–7.5	
Murchison division	2 (type A)	5.0 4.3	53 53	6.0 6.5	Boomerangs for musical corroborees. The instruments are called "Kileys."
	2 (type B)	6.0 9.0	44 40	4.5 5.5	As there were only four examples the actual measurements of each are given.
Central Murchison	8	7.2 4.5–9.5	56.1 54–60	5.1 4.5–6	Breadth is very consistent.
Lower Murchison	9	7.1 5.5–9	58.4 54–64	4.9 4.5–5	Breadth is very consistent.
Ashburton	12	7.6 6.5–9	62 55–68	5.2 4–6.5	
Broome	2	8 7.5	64 62	6.5 6.0	As there were only two examples measurements of each are given. The two appear identical until measured.
East district, York, Yilgarn	7	11.3 9–14	56.4 47–67	5.3 4.5–6.5	
Mount Margaret Kalgoorlie	6	8.3 6.5–10	60.7 56–65	6.0 5.5–6.5	Very consistent in width.
East and West Kimberley	12	9.4 6.0–15.0	57.1 45–66	7.0 5.0–8.5	There are two distinct types in this section. These have been separately examined as A and B. All are reddened and painted with stripes.
	(type A) 6	6.3 6–7	57 52–64	6.5 5–8	All said to be for ceremonial use only.
	(type B) 6	12.5 9–14	57.2 45–64	7.4 6.2–8.5	Said to be for ceremonial use only.
East and West Kimberley	9	8.1 6.0–11.0	59 54–70	6.4 5.5–7.0	Again there appear to be two types, A and B, but not so well defined as the ceremonial forms.

guished from all others. In the first place they are only slightly fluted, whereas all the others have deep longitudinal grooves. Their size, too, serves to distinguish them. One is 115 cm. long and 6 cm. thick, quite a formidable and heavy weapon. The other is 90 cm. long and 4 cm. thick.

Types of Shields from West Australia

Wooden shields are observed to vary so much in local form and decorative design that reclassification could be easily made if the specimens from all localities were mingled. The areas represented are Ashburton, Broome, Kimberley, Kalgoorlie, and Central Murchison. The diagrams in figure 5 indicate the most noticeable differences of the types.

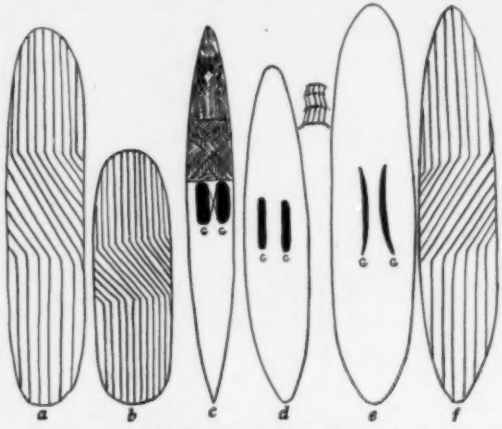


Fig. 5. Shields from West Australia. Scale: 1/5.

The average dimensions of five Ashburton shields like *a* are 90 cm. × 17 cm. The front of the shield is ornamented by deep, wide grooves that are painted alternately white and red, with lime (?) and red ochre. One of the shields is flat on both sides, but the remainder are slightly concavo-convex. The grip, situated on the concave side, is a strong, prominent, wooden, loop carved from the matrix of the shield. The ends are very round in form.

The general form of the Kalgoorlie shield (*b*) is somewhat similar to that of the Ashburton type. The former pattern is, however, shorter and broader than the latter type. Three examples from Kalgoorlie have an average length of 65 cm. and an average breadth of 19 cm. The fluting,

coloring, and grip are almost identical with those items of the Ashburton type.

Two shields from Broome of the pattern shown in *c* are easily distinguishable from all other shields of West Australia so far as the Museum collection is concerned. The examples measure 55 cm.×9 cm., and 89 cm.×11 cm., respectively. The Broome shield may be distinguished by the thickness of the wood, its density, and dark chocolate color. The fine incised work covers the whole face of the grip side of the shield. The shield is of a parrying type, being, one would imagine, too narrow to intercept missiles. The black patches (G. G.) indicate two deep holes of the sunken grip, which has a bridge of wood between the hollows.

Four shields, like *d* from Kimberley, have average dimensions of 77 cm.×16 cm. The grip is of the sunken pattern. The thickness through the center of the shield is about 7 cm., consequently this is a heavy type of shield, especially in comparison with *a* and *b*, in which the wood has a uniform thickness of about 3 cm. The Kimberley shield has a curvature so great that it has a boat-like appearance when placed on its convex side.

Specimens *e* and *f* illustrate the grip side and the face of the type of shield common in Central Murchison. The grip (G. G.) is of the raised type. The broad grooves of *a*, *b*, and *f* are similar in structure and coloring. Alternating colors of white and red have been painted along the grooves of each of these types. *f* is distinguished from *b* by its greater length and smaller width. In addition to this *f* is distinguishable from both *a* and *b* by its pointed ends. There are six examples of this Murchison type (*f*). The average length is 77 cm. and the width 17 cm.

An inspection of *a*, *b* and *f* shows that in *a* and *b* the grooves on the shield cross over from left to right in the middle of the face. On the contrary the grooves on *f* cross from right to left. I am informed that the left to right grooves have been cut by a right-handed man. A left-handed man cuts the grooves from right to left when he reaches the middle of the shield.

Spear Types from Western Australia

Murchison Gascoyne region (fig. 6).—*a*, spearhead of hard, dark red wood with four large barbs. Narrow oval in cross-section. *b*, eleven barbs somewhat irregularly carved. A spearhead only with two circular holes at the base. *c*, spearhead only, six barbs of downward curvature, hard yellow wood, groups of black incised lines round the shaft. *d*, one downward barb carved from the matrix of the spear, no binding, repair work of sinew and gum on the shaft. *h*, one barb of wood bound with sinew and gum to a shaft 243 cm. long. The shaft is slender. There is a tapering toward the butt, which has a small round hole for the hook of the spear-thrower.

Lower Central Murchison.—*g*, plain wooden spear with an irregular shaft 250 cm. long. The butt portion is of bamboo having nodes and a hollow stem, into which the foreshaft is socketed and tightly bound at point J. *e*, plain wooden spear with an irregular sinuous shaft, which is worked down from circular form to a flattened oval near the point. Hard wood of reddish color has been used. There is a circular notch for the hook

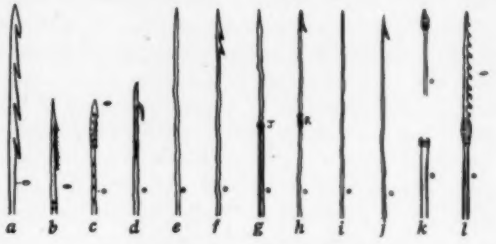


FIG. 6. Spears from West Australia.

of the thrower. Length 236 cm. *f*, the spear shaft, 268 cm. long, is made from fairly heavy, light brown wood. Two barbs are carved from the matrix; these barbs are without binding. There is no notch for the hook of a spear-thrower.

Southeast of West Australia.—*i*, very light spear of reddish brown wood, extremely slender at the butt, which has a deep circular notch for the

FIG. 7. Spears from Ashburton, West Australia. Scale: *a–g*, 1/10; *h–l*, 1/25.

thrower's hook. A distance of 15 cm. from the point is covered with hard black gum. Length 232 cm. *j*, very slender throwing-spear 242 cm. long. The one wooden barb is bound with sinew and wax.

Kimberley.—*k*, this is representative of a series of 16 spears from this region. The heads are of the well-known flaked glass and quartzite type. An oval lump of black gum attaches the head to the shaft. The fore part

of the shaft is extremely light in weight; it fits into a hollow bamboo butt portion which has a deep indentation for the hook of the thrower.

Northern territory of South Australia.—*l*, the twelve-barbed head is made from hard red wood. The fore part is socketed into a hollow reed-like shaft. Total length 273 cm.; length of fore part is 52 cm. The junction of the two parts of the spear is bound with fine sinew and covered with gum.

Ashburton.—The twelve examples in figure 7 illustrate a well developed local type of spear, whose technique is far in advance of that from any other part of West Australia. In no instance are the barbs bound with sinew or fastened with gum. On the contrary the barbs are carefully carved from the matrix. *a–g* are spear heads only. There seems to be little probability that they could have been used with a spear-thrower. Apparently they were, when shafted, of a heavy thrusting type. *h–l* are complete with somewhat heavy shafts. The length is about 260 cm., with only slight variation from this mean. Some are round and others are oval in cross-section as indicated in the diagram.

a, barbs in groups numbering 4, 3, 2, from above downward. *b*, a very flattened spearhead with six pairs of well carved barbs. *c*, has 28 pairs of barbs somewhat irregularly cut. *d*, the barbs are arranged in three groups of four barbs in each group. *e*, there are eight groups of barbs with four barbs in each group. The spear has the appearance of being decorated with rosettes. *f*, there are eight groups of barbs with four barbs in each group. *g*, this is a broad flat type possibly for ceremonial use. At the bases of *a*, *d*, *e*, there are circular holes. These may have been used for lashing the head to a shaft. *h*, there is one barb only. This is carved from the matrix and is unsupported by lashing or gum. The round shaft is considerably flattened toward the barbed portion. *i*, there are 18 barbs having a downward trend. The shaft tapers toward the butt. There is no depression for the hook of a thrower. *j*, an extremely heavy spear with five pairs of barbs. *k*, there are three barbs cut from the matrix of the spear. The butt tapers considerably, but there is no provision for the hook of the spear-thrower. *l*, the only spear with a head which is triangular in cross-section There are 18 groups of barbs with three barbs in each group.

In conclusion one may say that local differences are preserved remarkably well. The points on which further information is desirable are:

(1) The properties of flight of the different types of boomerangs, and the occurrence and distribution of the fighting and returning types in West Australia.

(2) The meaning of the word "yinmarrie" as applied to the flat slabs of wood, said in Museum records to be "ceremonial slabs."

(3) The reason for the much finer work on objects from Broome. The better workmanship may be due to the presence of a hard wood which gives good results when finely grooved.

(4) The various uses of passports and message sticks, and the symbolism of the marks on these.

(5) The reasons for the development of such elaborate spearheads in Ashburton. Those shown have no rivals in the West Australian collection, at Field Museum.

FIELD MUSEUM OF NATURAL HISTORY,
CHICAGO, ILLINOIS

NOTES ON THE ARCHAEOLOGY OF CENTRAL TEXAS

By FRANK BRYAN

THESE notes are intended to be little more than the presentation of data with a few opinions based thereon. The writer is hardly more than an amateur archaeologist and is acquainted with a very limited area. However, his profession, that of an oil geologist, has given him a chance to cover an area of some 400 square miles very thoroughly. Over a large portion of this area the geology has been mapped in close detail. Almost every acre of ground has been covered and every small gully walked out in searching for outcrops.

Throughout this geological work a more or less casual search of the ground as it passed under foot has been kept up. This search was for any change in soil that might suggest a change in geological formations, and for any stones and flints that might have been shaped by man. At first the interest was in the chipped flint and stone implements and their wide distribution. After several hundred had been found, it was seen that they could be divided into several general groups based on the kind of stone, shape of the implements, and color. Then it was also noticed that all the classes were distributed in about equal numbers over this area, and that generally speaking, the arrowheads found on the hills were all pretty much alike, and those found in the valleys were alike; but between the two groups there was a very marked difference.

That arrowheads found away from the streams and on the hills differed from those of the valleys and near the streams led to the supposition that they belonged to different ages. That the former were the older was inferred from the very marked difference in patina. This led to the conclusion that the upper and older arrowheads belonged to the old stream terraces in which they were discovered, although all were found on top of the ground, as no digging has been done. Some of the terraces are about 75 feet above the present streams, and that means that the whole country has been eroded that distance since the streams were where the terraces are now.

The area of some 400 square miles that has been covered in close detail, and which will be referred to as "this area," lies in about the center of the state of Texas and covers practically all of McLennan, Hill, Limestone, and Navarro counties. When any other areas are mentioned, they will be located in detail.

The geological formations outcropping at the surface over this area are of Cretaceous age and consist principally of soft beds of marls and clays

with occasional harder beds of chalk and sandstone. None of the harder beds are as hard as ordinary limestone, and compared with the marl and clay beds they are very thin, the Austin Chalk, with a thickness of some 300 feet, being by far the thickest.

Structurally the area is monoclinal with an average east dip, south 60 degrees east to be exact, of about 60 feet to the mile. This general east dip is arrested and broken up in local areas by faults. These faults run about parallel to the strike of the Cretaceous beds and vary in length from half a mile to fifteen miles. The throw varies from a few feet to some 600 or more in places. The larger faults are caused by the settling of large wedge-shaped blocks with a fault on each side of the blocks. These down blocks vary in width from one to five miles and the faults on the sides usually run parallel to each other, but in places they come together giving the block a boat-like end.

Not only do these fault blocks hold the key to the oil deposits—the oil is dammed up against their east edges—but they hold the key to the antiquity of man in this area and perhaps on the North American continent. Some of the Quaternary sand and gravel deposits, which contain artifacts in place in stratified beds, have been faulted down from 25 to 100 feet since the artifacts were dropped in the gravel. By drilling oil wells around and through these faults it has been found that they started back in the Cretaceous, and that there is probably still some faulting going on. One 600-foot fault was faulted some 350 feet in Cretaceous times and the remaining 250 feet in post-Eocene times. This is about the average of the ones on which exact measurements can be had. This fault is in the east edge of this area where enough Eocene has been pulled down to afford a measurement of them. The Eocene overlaps the Cretaceous in the eastern edge of this area, covering a goodly portion of the east halves of Limestone and Navarro counties.

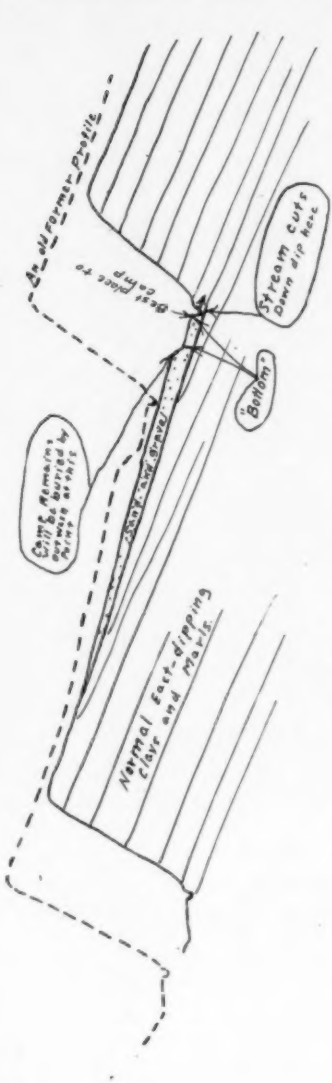
The stratified sand and gravel deposits, in which artifacts have been found in place, are in the big down-faulted block north of Waco in McLennan county. Over that block comparatively thick Quaternary deposits are to be found. They can be divided into some three separate stages and are not present over normal dipping unfaulted areas. These stratified beds have a thickness of about 150 feet on White Rock creek, about 4 miles north of Waco, where the Waco-Gholson road crosses that creek. An old gravel pit here is the only place where the thickness can be measured with any degree of accuracy, and it is doubtful if the full thickness is present there. The walls around this old pit stand a little steeper than the angle of repose, and in them all the different strata and stages of the deposition of the Quaternary

deposits can be easily seen. From the way these particular Quaternary beds are limited in area to the down-faulted block, it is probable that the block either settled and attracted the drainage from the surrounding area or, as the country as a whole was being lifted up, the blocks merely lagged behind, which would give the same results. The area of the down-faulted block was filled in with over 150 feet of quicksand and gravel in well stratified deposits, certainly mainly deposited in a lake or arm of the sea.

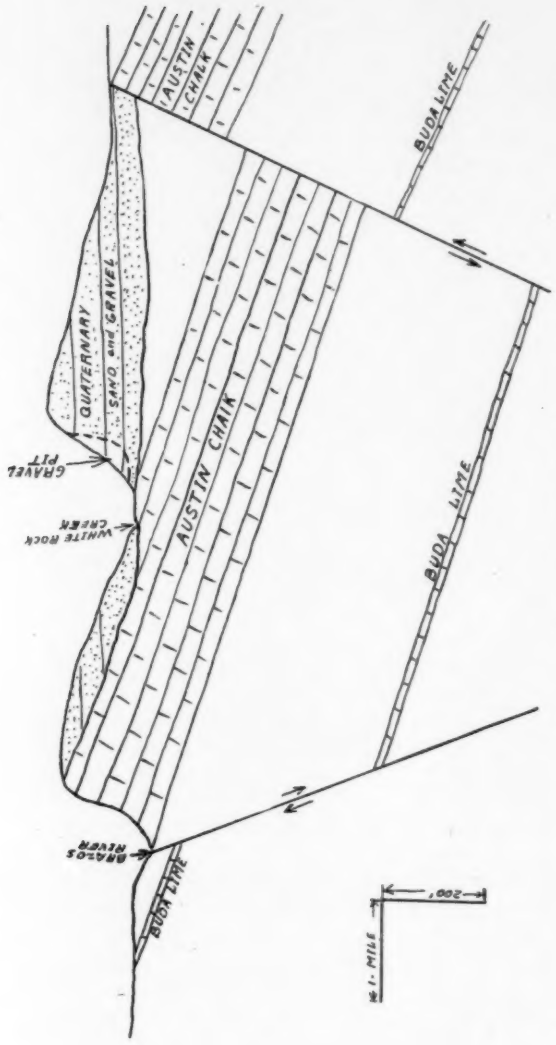
Some of the quicksand beds were probably only periodically covered with water during their deposition, or else they were marshes covered with very shallow water. Whichever was the case they proved to be regular death traps for the mammoth. There are so many remains of these giant elephants in this limited area of Quaternary deposits and, they are so well preserved, that they are certainly not the results of ordinary deaths. Some of these "dead-sand" strata—to use the technical name of the pit workers because the sand grains are too round to use in cement—have a number of the carcasses preserved almost intact. The outline of the full swollen body is plainly to be seen just as though it had sunk in the quicksand and was completely covered up before decay set in. These same quicksand beds contain occasional flints that are believed to have been shaped by man.

Subsequent to the deposition of the sand and gravel beds over the fault blocks, the faulted blocks took up the upward movement along with the surrounding beds. This upward movement exposed the soft sand and partially consolidated gravels to the full action of the elements. Some of the gravel beds have resisted erosion better than the surrounding Cretaceous marls and now are the highest hills in the country. The highest of these hills are fully 200 feet above the bed of the Brazos river and the upper 150 feet is all Quaternary sand and gravel. This thickness is a little less than half the average throw of the faults on either side of the block.

The best place to study the details of the deposition of these Quaternary beds and hunt through them for human remains is in the old gravel pits at the Waco-Gholson road crossing on White Rock creek. Here some 100 feet of them are exposed in good walls in three old horseshoe-shaped pits. These gravel pits are about the center of the down-faulted area. The fault on the west side of the block emerges from the Brazos river at "The Chalk Bluffs" and some eight miles northeast it goes through the town of West. South from "Chalk Bluffs" it follows the bed of the Brazos to the bend at the old town of Bosqueville. There it cuts across a neck of land to the Bosque and follows up the Bosque bottom until it dies out almost six miles farther on. It has a maximum throw of about 600 feet nearly three miles north of Chalk Bluffs.



Map 1. Type section across normal unfaulted areas. The dip slope hills average about 2 miles long and 150 feet higher than the bottoms. The sand and gravel, terrace deposits, creep down dip behind the streams.



Map. 2. Section across White Rock creek gravel pit.

The east fault is hard to follow as no good exposures can be found, but it can be traced out on correlation and follows close to the International and Great Northern Railroad all the way from the southern part of Waco to Leroy. It has some 300 feet of throw at Leroy.

White Rock creek drains much of the west half of the thickest Quaternary beds. The portion of its drainage area that is covered with the thick beds of Quaternary is very different from the normal unfaulted areas. Here the almost level beds of uniform hardness from top to bottom are cut into all kinds of odd-shaped hills which are about the same height on both sides of the creek. All parts of these hills are covered with trees. In the normal areas where the east-dipping strata are undisturbed by faulting the harder beds hold up long dipslope hills with steep escarpments facing the west that are usually barren of trees. (See map 1.) The east or dipslope sides are from one to five miles long and slope down at less than 50 feet to the mile on an average. These long gentle slopes are fairly open rolling prairies.

In the high walls of the White Rock gravel pits all the sand and gravel beds can be measured and studied in close detail. (See map 2.) The lower half seem to be débris from the surrounding Cretaceous beds, then there is a fairly sudden change to a Cretaceous and Permian mixture. It looks as though the Brazos or its predecessor did a little piracy and stole the head off some stream that reached out into the Permian beds that outcrop some 100 miles to the west. There seems to have been considerable variation in the size of the streams at different times. In places there will be as much as 15 feet of pure sand, then as much coarse gravel, and then another bed of sand, and so on up. The sand is all well rounded and was no doubt quite quicksandish when saturated with water.

Two lower sand beds contain the mammoth remains. The remains of the carcasses are little more than casts. Even the bones are soft enough to crumble between the fingers. The teeth are the only remains that are well enough preserved to be gotten out whole. They vary in size from no larger than a man's fist to over a foot long.

In the lower sand strata and the one that contains the greatest abundance of mammoth remains are found occasional flint fragments which vary in size from one to six inches long. Some of the smaller flints are weathered flakes and one has a faint percussion bulb on one edge. The larger flint stones have been broken or flaked off on all sides and resemble the larger flints found in the known prehistoric village sites of the country. They look like cores from which flakes have been broken off.

The writer bases his beliefs that these stones were shaped by human hands on the following facts. First, they are geological misfits. That is,

large stones weighing several pounds are not washed in for miles and deposited in the middle of beds of soft sand. Water-washed material is pretty well sized in transit, and large stones require swift currents and usually stay together for that reason. Careful study of the strata in which these stones are found shows no evidence of unusual currents that would account for the dumping of the large stones. Second, the ridges between the flaked-off faces are still sharp and show no evidence of having been washed and rolled about. If these stones were shaped by nature they would have been crushed and broken and have been in company with an accumulation of other large stones.

The same stones that applied the pressure necessary to flake off faces on all sides, some of them five inches and longer, would have ground down the angles between the faces, or else the angles would have been worn somewhat in transit. This is not the case. The faces on all sides are large and some of them show the indenture of percussion bulbs, and the angular ridges between the faces are still just as sharp as when the faces were flaked off. Third, they are foreign to the coarse gravel both above and below the sand beds in which they are found. None of the Quaternary beds exposed contain a large amount of flint stones. These occasional supposed artifacts are all the flints to be found.

If these stones were dropped by man, they were dropped a long time ago. The oldest have been covered by not less than 100 feet of the remaining Quaternary sediments, which were deposited during a local or regional depression. During or after a subsequent elevation of the region at least 250 feet of the strata has been eroded by the streams which are now this distance below the top of the Quaternary beds. The actual deposition and erosion exceeded these figures by the thickness of Quaternary deposits which have been washed off the tops of the hills.

The flints from these Quaternary beds, so far discussed, carry an element of doubt as they are not of the conventional forms. The lowest flint tool that is unquestionably man-made was found in a gravel bed some forty feet down from the top. It has the same age as those just discussed less some 60 feet of deposition. This tool is a form of knife some five inches long by one and one-half inch wide and three-eighths of an inch thick. It was broken in half to study the patina and the unaltered elliptical core was found to be less than 1/8th of an inch thick.

The unaltered core stands out readily to the eye. The patina is fully 1/8th of an inch thick. This knife is the oldest artifact the writer has found in stratified deposits. However, he has others that show a much greater degree of patination and from the position in which they were found he believes that they are at least as old.

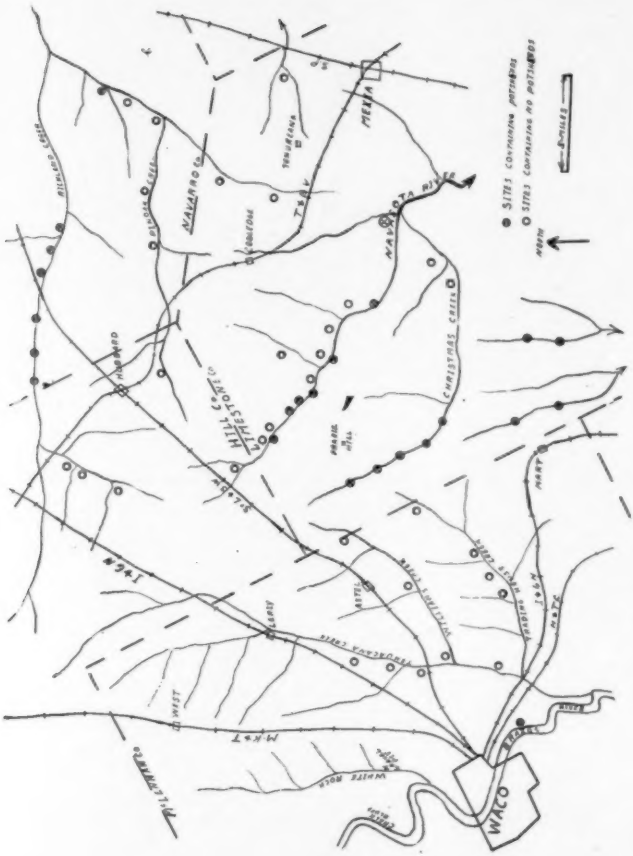
Anyone who visits the White Rock gravel pits can observe a reddish sand stratum in the bank on the north side of the road. The knife just described came from the base of that stratum about 50 feet from the west end of the bank.

The best place in this area for one interested in the age of the artifacts to search for them is in this old gravel pit. Artifacts once found can have their history measured about as accurately as it is possible to measure geological history. However, that does not mean that the normal unfaulted areas are the less interesting and that the specimens found in them are younger.

The undisturbed areas present entirely different problems. In them are to be found numerous old village or camp sites. Some 200 have been discovered and mapped to date. (See map 3.) These sites have an abundance of all the numerous flint and stone tools and projectile points common to Stone Age man the world over. Almost every type found in the largest museums of the United States and Europe can be duplicated here. Practically none of these old sites have been more than casually searched for artifacts. They are a collector's paradise, as field-hunting yields bigger bags, by far,than could be had by excavating. As an example, in two hours searching of the surface of one of these sites over 150 perfect arrowheads were found and twice that number of other tools, to say nothing of broken points and pot fragments.

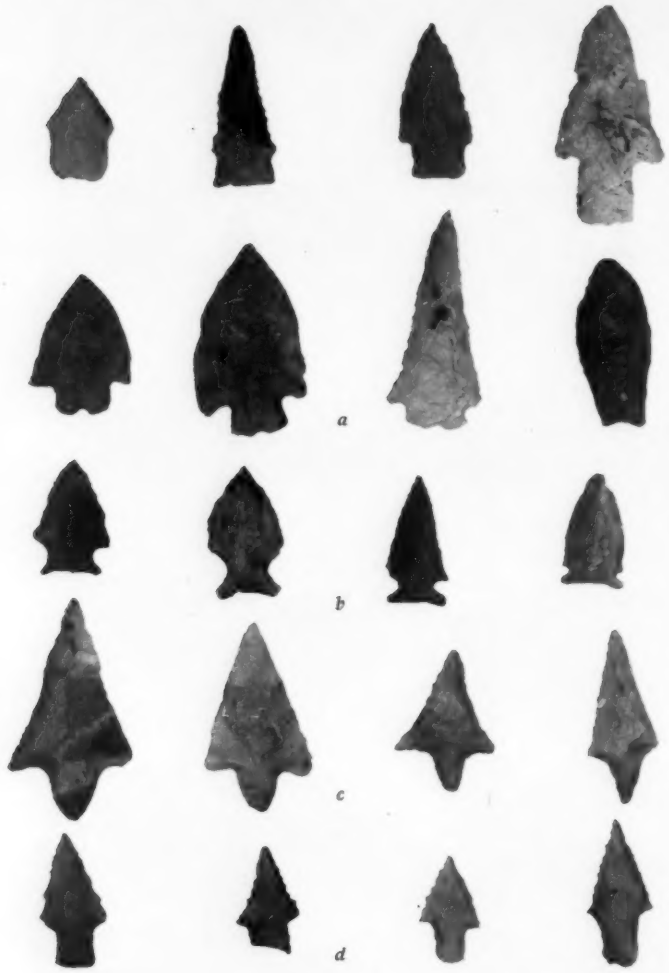
Some of the arrowheads and drills, etc., are the work of artists and represent the highest skill in the art of chipping flint, while others were very plainly the work of clumsy hands. They range in age from sites that are on the very banks of the present streams to terraces near the tops of the hills. Some of the latter are immediately post-glacial, if not glacial or earlier. They can be divided readily into four ages on geological position substantiated by the shape of the arrowheads, the patina, and the material used. The last two general ages can be subdivided into about ten more cultural periods on shape and material. These cultural periods may represent only wandering tribes that used material from different sources and each having a conventional form of its own. It would take more detailed study to determine this.

The method used in separating the artifacts found into general classes or ages was by first applying the basic principle of paleontology to them and then checking the topographical position and patina. The application of the principles of paleontology was the assumption that simple forms of arrowheads would be common to all ages, while unique and slightly complicated ones belonged to a more or less local cultural age. After separation of



Map 3. Two hundred village or camp sites located in "this area."

Arrowheads



Arrowheads

shapes the topographical position from which the different shapes came was plotted to see if there was any connection. It turned out that certain shapes were always found or predominated in certain terrace levels.

The outstanding example of this is an arrowhead made from a flint that weathers white. All samples are from the same material. As there is no local source all flint and stone had to be imported. These heads have a half moon-shaped concave indenture in the end of the haft that is instantly noticed (pl. 1*d*). They are found well distributed all over the four counties and the hafts are always alike. They are rarely found in the sites near the present streams, but are most common to the sites back on the edges of the hills at some 20 to 30 feet above the streams. This satisfies all conditions, a unique shape, common material, and a fairly uniform terrace level. Other haft shapes are equally good.

In plates 1 and 2 the heads are arranged in a tentative order of age. Four typical heads of each age have been placed together to show the different points built on the same shaft. Plate 1*a* is believed to be the oldest, and plate 2*d* is believed to be the youngest. The others are to come in between in about the order shown. However, while each row is held to show the prevailing type of a cultural age, the order of the ages is not to be taken as correct at this time.

Above and older than the "concaved base" the arrowheads are of the simplest forms and differ from the simpler forms of the later ages in material only. Few of them are of flint; they are usually of quartzite. This was at first thought to be imported from some distant source, but comes from a coarse gravel deposit scattered over the hills in the eastern part of Limestone county. The last two ages used every kind of local stone, including a peculiar greenish glauconitic flint that occurs in the Eocene limestone beds of eastern Limestone county. The Eocene limestones only have occasional nodules of the glauconitic flint in them, and so far none of the nodules have been found intact. The marks left by the people who dug them out and knocked the protruding portions off are still to be seen on the limestone near where fragments of nodules remain in place.

To designate as "terraces" the sand and gravel stream deposits in which the older artifacts are found, is a little misleading. The different stages merge too closely for any distance line of demarkation. They join together to form a sand and gravel veneer over the underlying Cretaceous marls and clays. This is particularly true on the long dipslope hills.

As the whole country is lifted up the streams slip down dip on the gentle dipping strata. This is true even where there is no hard stratum. It seems that even soft marls are cut into more easily parallel to their bedding

planes than down through them. This tendency of the streams to work down dip in the strata is the basic reason for the saw-tooth effect on the topography. Working down into the beds about parallel to the dip, the streams are continually undercutting ahead to the east, causing high west facing escarpments to be formed, and leave behind them long gentle east sloping hills pretty well covered with a sand and gravel coat, designated as terrace remains for want of a better name, and it is in this that all the older artifacts are found.

The streams find the Cretaceous marls and clays much easier to cut and carry away than the sand and gravel, and for that reason have a tendency to stay on the escarpment, or down dip side of their flood plains or "Bottoms," to use the local names. The bottoms are always covered with heavy timber and have sandy soil, whereas the steep escarpments on the other side of the streams have black gumbo soil with no timber. This detail is mentioned because it explains the great percentage of old camp sites preserved intact for present study. Between living on the shady sandy soil or the barren black gumbo the natives always chose for camp sites the sandy bottoms. The streams rarely double back through their bottoms so that any buried dead and the material placed with them, as well as all the camp débris covered up in the soil, were left intact by the stream upon the banks of which they were buried.

Camps were probably shifted down dip after the streams, leaving the abandoned sites to be covered over with flood water deposits first and later by outwash from the low hills. This covering up with outwash began after the stream had cut into the escarpment of its east bank until the west side of the bottom had reached the abandoned site, and kept up until the outwash swell or creep from the hill had passed over it. The swell is a portion of the cycle that befalls all the bottoms. Heavy rains wash material down from the hills which is dropped, in interlocking small delta-like deposits, on the up-dip side of the bottom. This fill rarely gets to be more than five feet thick and advances at about the same rate that the stream adds to the bottoms by cutting into the escarpment on the other side.

A site once buried remained so until the bottom, following the stream, had left it some 600 yards behind. At that stage the covering up had ceased; the elevation above the bottom was high enough for erosion to set in, and the covering was removed and washed down to fill in the near edge of the bottom, thus completing the cycle.

A good example of an old village site, that has been covered by the outwash from the hill, is near the north edge of the Navasota river bottom where the Cooledge-Frosa road crosses the Navasota. The site is in the

first stage and has been covered about three feet. It can best be seen in the ditch along the east side of the road.

After exposure of the remains in a site, which has gone through the covering up stage and reached the point where the covering has been washed off, they creep down-hill much faster than one would suppose. The broken rocks, flints, etc., being larger than the sand and small gravel, do not however keep pace with the outwash swell or wave, but lag slightly behind.

The first cutting into the camp site by the erosive agencies exposes all the remains to the action of the elements. Buried bodies, bones, and pottery if any, are completely disintegrated, and washed away in small bits. Only the flint and stone implements and the broken pieces of stones are left. Even the small flint flakes and probably the tiny flint tools, if any, are washed away. (This may account for the absence of the tiny arrowheads and potsherds in the older camp sites.)

All the coarser material and implements that are not washed away start a general concentration movement into piles, something like the secondary enrichment of ore bodies and the gathering together in pools of small particles of oil. The heaping of all the artifacts scattered, say, over an acre of ground into a few small piles is much easier for nature than the accumulation of small oil particles, widely disseminated through sediments, into a pool of millions of barrels.

The creep down the long gentle dipslope hills, of the sand and gravel terrace deposits with all the cultural remains in them, is not a smooth even movement, but rather a series of erosional waves that sweep back uphill from the bottoms. Small gullies and ravines from one to ten feet deep cut into the soil and work up hill. These join together in groups that fan out over a few square feet to as much as an acre or more. Each group lets its drainage area down from one to five feet, depending on its size and gathers the larger stones into the deepest gullies through which they are washed by flood waters to the mouths of the gullies, where they are dropped owing to flattening of gradient. Broken stones and flints over sometimes as much as an acre are gathered through one of these fanshaped gully groups into one pile at the mouth of the main gully. The sane and gravel are carried some few feet beyond the larger stones before being dropped, where they are usually deposited in small delta-like deposits on the hill slopes. The water trickles out of the deltas, gathers together again in another stream, and flows into another gully head. Thus the cycle of cutting back of gully heads, washing down of débris, and redepositing it, may be performed by one flood-rivulet a dozen times in its course from the top of the hill to the bottom of the slope. Every time the remains of

an old village site are lowered a foot or more the implements are gathered into increasingly larger piles, and the piles, as a rule, move closer and closer together with each letting down of the land surface.

Where an unusually large group of gullies fans out up hill and gathers the flood waters of as much as five acres into one gully mouth or bottle neck place, all the artifacts dropped within the area will eventually reach the neck and be dropped at its mouth, just as in the case of the smaller groups, but on a larger scale. In some of these larger deposits the cultural remains are in beds several feet thick and have been miscalled "middens." Some of these deposits have resisted erosion to the extent of being low mounds, but they need not be confused with middens or man-built mounds, since they contain no bones or perishable remains.

Wherever a comparatively large group of small rivulets has recently gathered into one pile the remains from over a large area, of say, five acres, the artifacts of several ages are brought together. Such places are poor for data on age. The small isolated sites are better in that all the implements are of one kind and typical of their period.

This process is still going on, and every village site is at some stage in the cycle. Some are caught in small erosional waves and moved only a few yards in a completed cycle, while others descend a hundred yards or more in one cycle. No two are being moved in exactly the same way, details varying with the general topography. All are following with the same general trend, the tendency being toward continual concentration of like sizes into smaller and smaller areas.

The creep down-hill and the rapidity with which the erosional waves repeat have been speeded up in the last hundred years by cultivation of the land. Until the last few years practically none of the fields were terraced and the unprotected plowed soil readily washed away. Some fields, where small patches have been protected by house or hedges, are on the average four feet lower than they were fifty years ago. In fields showing as much as five feet of erosion since the land has been farmed, the remains have in the same time moved downhill about 40 feet on the average,—about ten feet to every foot of surface erosion. One site visited last year had a small gully some two feet deep and thirty feet long cutting back into one edge of it. This year the head of that gully had cut back at least fifteen feet farther into the bed; and with its tiny tributaries has lowered a good 150 square feet an average of about one foot. All the artifacts within this area had been deposited about where the head of the gully was last year.

Thus, while a large accumulation of broken stones, artifacts, etc., are the remains of an old camp site, they are not necessarily on the same

spot where they were originally left. Since the first erosion removes all the bones and pottery remains, if any, their presence is good evidence of an undisturbed site. Such a one usually has an abundance of potsherds, bone fragments, tiny arrowheads, and fairly large masses of burnt stones.

The bone fragments are both human and animal. Four male human skeletons were uncovered in a levée ditch that cut through a site on Harris branch in Navarro county, about five miles north of Dawson and about half a mile above where Harris Branch empties into Richland creek. Two of the skeletons were about two and a half feet deep, and two about one foot. The upper two were partially over the lower.

The sites with the largest number of human bones exposed lie on low sandy hills or mounds in the edge of the bottoms that rise from three to fifteen feet above flood water. At some time in the past the streams, probably in their meanderings, flowed by these low hills for long periods of time. Practically all the low hills jutting out into the bottoms of the large streams like the Brazos and Navasota rivers are recent camp sites and contain remains of human bodies in large numbers.

When the streams flowed close to low hills these offered natural advantages, such as closeness to water and freedom from floods,which made them unusually good camp sites. The natives took full advantage of them, as shown by the enormous accumulation of broken stones, chipped flints, and other evidences of human habitation. Sometimes, where hard ledges of rocks have for ages, held the streams in comparatively narrow channels, the accumulation of imported flint fragments and artifacts runs into tons.

Such sites are wonderful places for a collector, but all ages are intermingled so that classification as to geological age is impossible. In two, which are still good camp sites, beer bottle bottoms are to be found lying beside artifacts of great antiquity. The variety of material is also large. Fragments from all sources are to be found. The farthest source so far recognized is the Boone Chert, Mississippian age, from northern Arkansas or Missouri, the nearest outcrop of which is five hundred miles away.

Most of these large, more or less permanent sites are pretty well known to local collectors. They are not very common, and were not large enough at any one time for more than a very small percentage of the population of the country. Almost every acre of the present bottoms of the streams has been lived on at one time or another, not only laterally, but in depth as well. Every drainage ditch or cut-off, where flood waters cut cross bends, that has cut down as much as three feet into the alluvial will expose some artifacts. This is also true down to depths of as much as ten feet. The evidence of human habitation at these depths is usually nothing more than thin layers,

which were at one time land surfaces, that have scattered broken stones and occasional shaped tools and arrowheads in them. In these buried sites the bones seem to be pretty well preserved, but so far the writer has not found enough to justify digging out. The bones are usually broken fragments. The deepest one so far discovered is in McLennan county, about 1/4 of a mile down the Tehuacana creek from the crossing of the north Waco-Corsicana road. The remains are covered with ten feet of alluvial deposits and are best exposed where a cut-off flows back into the main stream.

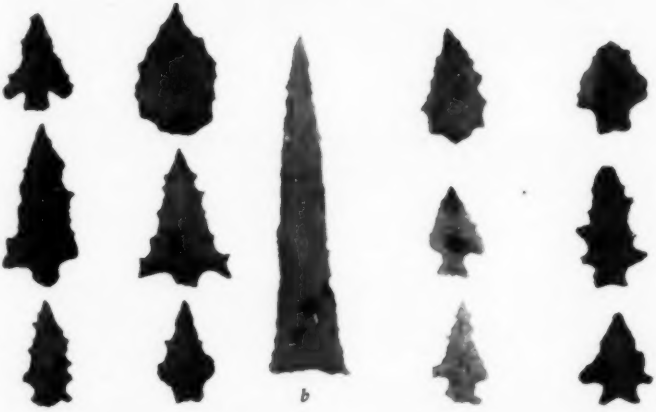
The small streams, even the intermittent drains with bottoms less than 500 feet across, have remains of small camp sites every few yards and seem to have been lived upon everywhere at one time or another. The artifacts found in the bottoms of these small intermittent streams are the youngest of them all, and it is here that the potsherds are the most common. None of the sites are large, and the broken stones are not so abundant as in the larger sites. Most of the remains are finished implements. In some, the arrowheads themselves outnumber all other remains. It is in these small sites that the greatest percentage of perfect unbroken implements is to be found, owing probably to the absence of stones to break them as they are rolled about in plowing. The small amount of débris present makes it easy to overlook these little sites, but once found they are rich in museum specimens. Over fifty perfect arrowheads alone were found in one in less than thirty minutes. The workmanship, from an artistic point of view, is of the highest order. Since no manufacturing was done there, these small camps must have been temporary stopping places. Their occupants were superior in flint chipping to the people residing in this general area during any period.

The large distribution of these small sites over the flood plains of the small streams shows that the last of the flint users considered any place in the narrow bottoms good enough to live in. These people seem to have clung to the drainage area of one large stream and rarely crossed major drainage divides.

The divide between the Trinity and Brazos rivers twists around through Limestone and Navarro counties. Among the oldest arrowheads, from the upper terraces, there is very little, if any, difference between those found in the two drainage areas. However, the younger heads, found next to the streams, differ markedly. This tends to show that there was little, if any, traffic between the people of the Trinity and the Brazos before the coming of the white man and horses, after which the use of flints was discarded.

The first noticeable difference between the artifacts of the two drainage areas is in the material used. On the streams of the Trinity system most of

a



b

Arrowheads

the implements were made from quartzite, flint tools being rare, while for the Brazos area the reverse holds. In the shape and style of arrowheads the most noticeable difference is in the finish of the heads. On the Trinity side the great majority have well-shaped and sharp barbs projecting from the sides, and so far these barbs have not been found on any of the streams that drain to the Brazos. Plate 3*a* illustrates small points and knives from the Brazos, and plate 3*b* illustrates similar implements from the Trinity.

A good place to study this difference is in western Limestone county. Christmas creek, the stream that crosses the Waco-Mexia road about a mile west of Prairie Hill, flows to the Trinity. Elm creek, the first stream east of Ben Hur, flows to the Brazos. Both streams were lived on solidly clear up to their very heads, and east of Ben Hur are less than four miles apart, with a low prairie divide between them. Yet even here there is no overlap of the cultures peculiar to the two major drainage areas. This, of course, only applies to the heads found within the present bottoms. The older pieces, noticeably the ones with the concave base to the haft, are common to both, but they are rarely found in the bottoms.

The difference between the Trinity and Brazos culture is most marked in the barbed quartzite heads, but that is not the only shape that can be used as a marker. There are some half dozen others, but the writer's Brazos collection is too poor to make a positive assertion. Some of them may be common to both. There are some dozen peculiar shapes that must each belong to some cultural age of wandering tribes. The persistence with which they cling to the same material and shape, regardless of where found, mark them as of one common origin.

One type that has particularly attracted attention is a very flat head with a clean cut "V" in the base of the haft. The two left heads in plate 2*b* are typical shapes. This head is always of a rose-colored flint, and so far is common only to the Trinity, but is different from the general run of Trinity culture. The source and distribution of that flint would be interesting to know.

With the meager facts at hand that point toward a clinging of certain shapes and material to the drainage areas of the streams on which they are found, it ought not to be hard, with a car and good roads, to test it out over a large area. The Brazos, Trinity, Red, and Arkansas rivers will be searched from one end to the other. The plan is to stop at a stream crossing about every fifteen miles, find one old camp site, and get enough specimens to determine the shapes and material of that local area, plotting them on maps as is done in geology.

Box 188,
WACO, TEXAS

PETROGLYPHS, THE RECORD OF A GREAT ADVENTURE

By MARY RUSSELL F. *and* HAROLD S. COLTON

IN THE Painted Desert of northern Arizona, one mile south of Willow Springs, and six miles west of Tuba City, several large boulders of Wingate red sandstone have broken from a cliff and rolled into a valley. One of these rocks bears petroglyphs on every side, including the top (see pls. 4 and 5). These petroglyphs date from late prehistoric to modern times and are quite unlike the ancient ones associated with pueblo ruins and cliff dwellings. Although lying 50 miles northwest of Oraibi a particularly well-informed Hopi Indian[1] has identified the petroglyphs as Hopi clan symbols.

Though unable to identify all the drawings, he has identified most of them. Depending upon the skill of the artist, different forms of the same symbol appear. At other times different symbols stand for the same clan. These apparently unrelated symbols for a given clan are explained in the clan legend (figs. 1 and 2). Where the same symbol is repeated with the same technique, we were informed that this represented repeated visits by the same individual. Among those that our informant recognized are two extinct clans. He suggested that the unrecognized symbols may also be extinct clans.

Our Hopi informant recognized the following clans, which list has been compared with those of Mindeleff[2] and Fewkes[3] and shows some differences. As Voth[4] has pointed out, Hopi clans grade into one another, so that no two informants will agree; thus, confusion results. The asterisks indicate the clans whose symbols have been recognized on the rock.

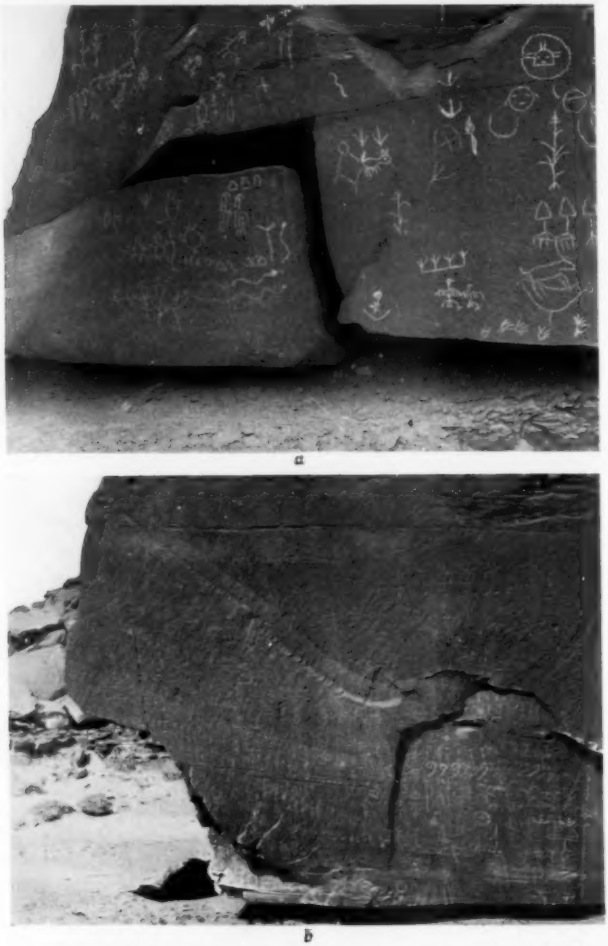
Agave.
Asa (tansy-mustard).
* Badger. Symbol, footprints.
* Bear. Symbol, footprints.
* Bluebird. Symbol, small bird.
* Bow. Symbol, bow.
* Butterfly. Symbol, butterfly.
Cactus.
* Cloud. Symbol may also be a rainbow, lightning, duck, tadpole, frog, or any aquatic animal.
* Corn, melon. Symbol is usually a corn plant, but may also be the "germ god."
Cottonwood.

[1] Edmund Nequatewa.
[2] Cosmos Mindeleff, Localization of Tusayan Clans, BAE-R, 19: 639–649, 1900.
[3] J. Walter Fewkes, Tusayan Migration Tradition, BAE-R, 19: 577–633, 1900.
[4] H. R. Voth, Hopi Proper Names, Field Columbian Museum, Publication 100, 1905.

a

b

a, Picture Rock near Willow Springs. All sides and top are covered with pecked petroglyphs of the symbols of Hopi clans. *b*, south face of Picture Rock Typical petroglyphs have been chalked. The rest are invisible in the photograph.



a, part of the east face of Picture Rock. Typical petroglyphs have been chalked. *b*, part of the west face of Picture Rock. Petroglyphs are unchalked.

* Coyote. Symbol may be a wolf, yellow fox, gray fox.
* Crow. Symbol, a crow or track.
* Eagle. Symbol may also be a turkey or turkey buzzard.
Fire. Symbol may be firewood, piñon, juniper, or the face of Masauu.
Hawk. May include turkey.
* Horn. Symbol may be antelope, mountain sheep, deer, or anything with horns.
* Katchina. Symbol, katchina masks or spruce bough.
* Lizard. Symbol includes horned toad and snake. The latter may confuse it with the Snake clan.
Mescal cake.
* Moon (extinct). Symbol may also be a star.
* Oak (extinct). Symbol, the wooden stick on which the maiden's hair whorls are built up.
* Parrot. Symbol, a bird with a curved beak.
* Rabbit. Symbol, a rabbit or a rabbit's ears.
* Red ant. Symbol, an ant.
* Reed. Symbol may also be an arrow or road runner.
Tobacco. Symbol may be either a plant or a pipe.
* Sand. Symbol, a circle or square representing a field sometimes inclosing a cross. The cross represents the points of the compass.
* Sivapi (rabbit bush). Represented by the blossom.
* Snake. Symbol, a snake.
* Snow. The symbol is a cloud without lightning and can therefore be confused with the Cloud clan symbol which is frequently drawn with lightning.
* Spider. The symbol is either the spider or web.
Squash. The symbol may be also dove or crane.
* Strap or rope. Symbol, a rope with noose.
Sun.
* Sun forehead or rising sun. Symbol, a half sun.
Young corn.

The Hopi informant explained the rock and its petroglyphs as follows:

Down in the labyrinthian depths of the Grand Canyon of the Colorado river and the gloomy box canyon of the Little Colorado, abide the spirits of the Hopi. From the great canyon they emerged in the dim past and down into its mysterious depths the dead return to reside in Hadean gloom. Weird legends deal with the ghostly inhabitants who, arising from the abyss with glowing eyes and monstrous form, travel out across the Painted Desert to revisit their earthly homes on the Hopi mesas, where they maintain a lively and beneficent interest in human affairs.

It is natural, therefore, that these great canyons, the abode of the dead, should have been regarded from time immemorial with superstitious dread. In the bottom of the canyon of the Little Colorado, on the west side near its

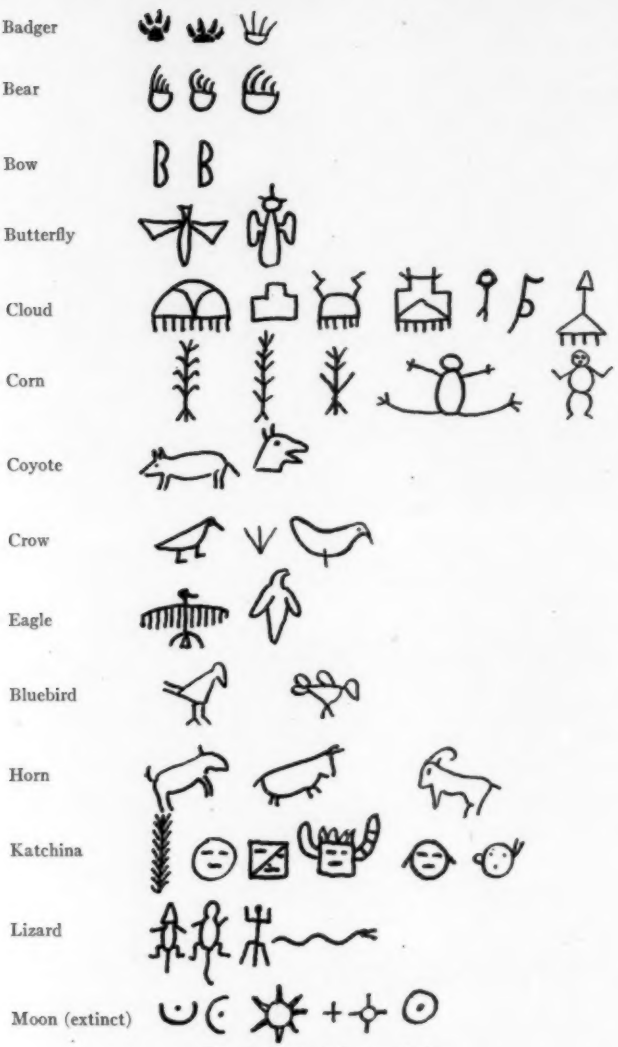


FIG. 1. Typical clan symbols.

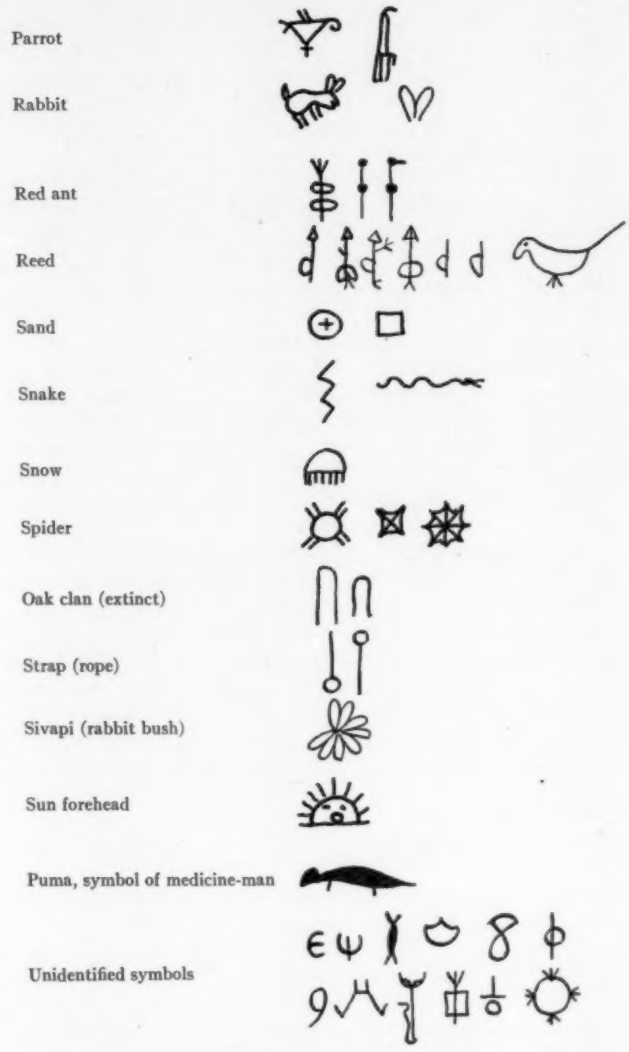


FIG. 2. Typical clan symbols.

junction with the Colorado, there is a salt deposit formed by dripping springs in the canyon wall. An ancient trail runs from the Hopi villages across the mesas to the valley of the Moencopi, along the foot of Echo cliffs and thence across the desert to the rim of the Grand Canyon where it plunges in and follows the south side to the mouth of the Little Colorado and crosses it to the west shore

At the point where the old trail enters the Grand Canyon there stands a pinnacle of rock just below the rim. To this it is necessary to attach a rope to lower the adventurer to the trail below. It is said that the remnants of an ancient yucca rope still hang from the pinnacle and that it was the custom of the Hopi salt gatherer to bring with him a generous supply of cornmeal mush, boiled until as sticky as chewing gum, to assist in holding the rope against the rock and to prevent chafing.

From prehistoric times the ancient peoples have made this precarious journey down to the old salt mines, through the dreaded underworld, and back up the rope way, with heavy burdens on their backs, where a single slip would mean a drop into the abyss thousands of feet below. Only a man with a strong heart would dare to let himself down out of his sunlit desert world into the eerie gloom, where a terrible silence engulfs every living thing. Such a man would be proud to return alive and his desire would be great to have a permanent record of his adventure. But would he undertake so hazardous a journey for salt alone? It is true that salt was an epicurean treat before the advent of the white man, but it seems likely that there were other and more accessible sources of supply. The salt from the old mines in the Little Colorado was not common salt. It possessed magic properties. This salt had once been the possession of the two brothers, Brave Boy and Echo, now commonly called the Two Little War Gods though they actually have no connection with war. They were the mischievous grandsons of the wise old Spider Woman, kindly protector of the Hopi people.

A whimsical legend gives a detailed account of a prank perpetrated upon their grandmother, the Spider Woman, which so infuriated the old lady that she chased the bad boys all the way from the Hopi towns to the Grand Canyon. They descended into the depths to escape pursuit and sat down to rest in a cave at the junction of the rivers. Here one of the boys laid aside his lump of salt which he had carried with him, and when they commenced their return by the way they had come, he left it in the cave. Just before they reached the top they decided to sit down and wait for awhile in order to make sure that the old Spider Woman was not lying in wait for them there. They sat so long that they turned into two pinnacles

of rock, side by side, and as they never returned for their lump of salt it is there today. No matter how much the people carry away, it is continually renewed by the magic of the Two Little War Gods.

It is believed that the family of the Spider Woman always enjoyed good health and that those who eat the magic salt will be healthy likewise. Of the two pinnacles of the War Gods, only one now remains at the head of the trail and to this the yucca rope was attached.

When the early salt gatherers trotted down the trail by the red Echo cliffs, they felt a great urge to leave a record of their daring. They came upon a great sandstone boulder close beside the way and here they stopped and each man, with the point of a sharp rock, laboriously pecked into the smooth surface of a boulder the symbol of his clan, that all who passed that way might read. They may have been men of the Cloud clan or the Bear clan or, perhaps, a clan long since vanished and forgotten. But they set their mark, their record of a great deed.

Through the centuries many brave men came down the old trail upon the same errand, an unending line back into the dim past. Each man paused beside the boulder and placed his clan symbol beside those of his clan brothers who had preceded him. Finally the great boulder became crowded with an intricate record of the clans, an overlapping network which covered every surface of the rock. And still men came along the slender trail bound upon the great adventure and now human desire had become a ceremonial necessity, as they paused to leave their symbol on the enduring rock. And the record moved on to another boulder and to another, and who can say they do not still pass that way? There are symbols there of recent date, whether idly placed or with ceremonial intent.

The Willow Spring rock may be a rosetta stone. Perhaps we can interpret many of the earlier petroglyphs as clan symbols placed on a rock to record some great adventure.

MUSEUM OF NORTHERN ARIZONA,
FLAGSTAFF, ARIZONA

A BEAR RIVER SHAMAN'S CURATIVE DANCE

By GLADYS A. NOMLAND

THIS dance was made on Eel river near Fernbridge, Humbolt county, California, on April 24th, 1930, by a woman of about sixty-five years of age, called Nora Coonskin. She is a Bear River woman of the Northern California Athabascan group.

In early life she had been trained for a doctor or shaman by her mother, who was also a powerful shaman, at a place called Mess-e-ah on the lower Bear river, but she was thought to have too much power for her tender years and did not practice doctoring from the time that she was about thirteen years old until very recently. She told me that spirit voices had warned her lately that she would die soon unless she again practiced shamanism. She began to dance and sing for the sick when called upon and has now been given so much spiritual power that she is impelled to continue with her doctoring.

The dance was held in a vacant house where a heating stove had been installed and a bed for the sick boy, a tuberculosis patient about sixteen years old who was so emaciated and weak he had to be carried in from the automobile and put into the bed. Chairs and benches were arranged around the room and two lanterns hung on the walls at opposite corners. The floor had been swept and dampened. A special chair was placed for the shaman[1] facing the east, with a mat of rush in front of it.

The doctoring ceremony began about 8:30 p. m. The shaman first removed shoes and stockings and put on a cotton wash dress, after which she smoked from an old sacred tubular pipe about six inches long, which had a ferrule about two inches wide of polished stone at the large end and a smooth wooden mouthpiece inset with diamond-shaped pieces of abalone shell. At each puff on the pipe she exhaled with a hissing sound and called out in a loud voice "Shah!"[2] looking upward and all around the room. The spectators then kept silence. She smoked five or six puffs and then handed the pipe to an old woman assistant who sat on her right. The assistant held out the pipe in her right hand and began to recite, in a loud voice, a formula prayer[3] calling upon the spirits to aid the shaman and give her power. Immediately after the prayer the shaman began to sing, very low, and the spectators sang a second part accompanying her. She sang louder

[1] Shaman or doctor called Iss-en'-eh.

[2] "Shah" means "sickness get away; go back from where you came."

[3] This formula is always the same and precedes the singing and dancing of the shaman.

and louder, her assistant singing her song, while the spectators sang the second part to the main song. As she sang louder and faster she reached behind her for her staff of hazelwood,[4] which was about five feet long, and held it out from her with her right hand using the floor as a pivot for one end and shaking it in a circular motion as she sang. As soon as the spiritual power became strong enough, she got up and began dancing on the mat in front of her chair, holding out the staff in different directions with first her right and then her left hand, singing and stamping in time to the music. She stopped singing at times and let the assistant and the spectators carry on the song, breaking in at intervals and singing again. As she became more excited she handed the staff to a man sitting on her left and danced to different parts of the room, sometimes singing, always facing the east, holding up first one arm and then the other and sometimes both of them. At this point the assistant took out some live coals and put them on top of the stove and then burned angelica root on them until the smoke penetrated to all parts of the room. (Angelica root is sacred to the spirits and induces them to enter the house, and gives spiritual power to the shaman.) The shaman finally danced to one corner where some children were sleeping and got a little girl. She held the two hands of the child lifted above the head and danced with her to the patient's bed, and back and forth for a few times. She then discarded the child, who went back to bed, and danced to the side and in front of the patient's bed, holding out her hands towards him. By this time she was so excited and exhausted that she was panting audibly and two men stood behind her ready to catch her when she fell. Suddenly she threw herself backwards onto the floor, screaming piercingly. The men caught hold of her and eased her to a better position. The singing stopped abruptly. Her hands grasped her throat and her legs and body contorted as if in an epileptic fit. The men held her to prevent injury, and finally partly lifted and dragged her to her chair as the paroxysm lessened. She remained in her chair, half reclining, half resting, and moaning for some little time. She then began to hiccough, cough, retch and vomit, holding her two hands in her mouth, until she extracted the pain[5] which had entered her, through her hands, from the patient's body. She stood up and held her two hands clasped together, with the pain between the palms. As soon as she had regained her breath, she opened her hands cautiously and examined the pain, laughed a little, and started to sing and dance again in order to dispose of the pain, which she sent away in the direction from which it came. The spectators sang

[4] Young pine may also be used where hazelwood is not available.

[5] Pain is called "sill-luck."

with her until she sent the pain away, then everyone stopped singing, talked of everyday happenings, smoked cigarettes, and jested, while the shaman rested.

The second part of the ceremony began with the reciting of the prayer, by the assistant. The shaman sang a different song and danced as before, but this time instead of burning angelica root the assistant stood in front of her chair and danced with two eagle feathers in her right hand. She sat down as the shaman began panting and was about to extract the pain. The shaman got the pain from the patient so swiftly this second time, that she was knocked over flat on her back, the supporting men failing to catch her—a very hard fall—she became unconscious but revived after having a cup of water thrown in her face. She then began to moan and groan and contort with all the appearances of great suffering. The men dragged her to her chair, where she rested, moaning, and then coughed and vomited up the pain, as before, stood up and began dancing and singing again, accompanied by the spectators. After regaining her breath she opened her hands and looked at the pain, laughed again and got down on all fours, and walked like a dog. She danced, on all fours, to the door, which was opened for her, and took the pain "outside, where it belonged," sending it in the direction from which it came. She explained to me afterward that poison is made by cutting off the end of a dog's nose and boiling it and using the water to sprinkle on the ground where the victim steps on it or breathes the evaporating liquid, or by putting it on the end of a stick or string and dangling it in front of the sleeping victim's nose or open mouth. The person administering the poison puts on a dog's skin and goes out among people at night to find his victims. He is counted as a "devil" and when this kind of a pain is extracted the shaman is impelled to act like a dog in order to send the pain away in the direction from which it came. This conception of a devil is, however, intrusive from the Wiyot and was not used by the Bear River Indians in olden times.

The third pain was extracted by the same ceremony except that there was no burning of angelica nor dancing by the assistant with the two eagle feathers; instead, the shaman opened the stove as she danced, took out a handful of live coals, put them on top of the stove, and used them with bare hands to light her doctoring pipe, which she smoked for a time while dancing. She again took the little girl and danced with her, taking the pain out of the patient through the child's hands.[6]

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[6] This little girl had been accused of pushing the little Burt grandson off the pier and drowning him. The boy was drowned four days before, and the shaman was proving that the

The next two pains were extracted by repeating the ceremony, again with some variation. The assistant shouted out the prayer, then the shaman sang a different song, danced but failed to finish taking out the pain.[7] She went back to her chair, smoked the pipe and began all over again with the same song, this time carrying the ceremony through to the end.

After the fifth pain was extracted, the regular shaman's treatment for the patient was finished and she sat down and smoked cigarettes while the assistant gave the last dance.

The assistant smoked the doctoring pipe, and at each expulsion of smoke called out "Shah," and looked upward and around the room. She took out her two eagle feathers and held them in her right hand. With her left hand she threw a basket, about eight inches in diameter, on the floor in front of her feet. She began to sing, the spectators accompanying her, and finally got to her feet, picked up the basket, and began to dance, waving the feathers and making a scooping and brushing motion with them and the basket, all the while singing and ejaculating "Shah!" She danced all over the room—always facing east—into the corners, calling out "Shah!", and at last danced to the door, which was opened for her, where she waved, brushed and scooped with basket and feathers, and sang for some time crying "Shah!" "Shah!" Then the door was closed, everyone stopped singing, and she sat down. This dance was explained to me afterward by the shaman as being always the finish of the curative ceremony, and is made to drive out all evil spirits that may be hovering around the room or house.

Everyone talked and smoked as soon as the assistant finished dancing. The shaman got up and went to the river and swam, although it was 1:30 a. m. and raining. After the shaman returned from her swim, we all went to the patient's parents' house, where we had a big feast of boiled eels, fish, eggs, bread, coffee, etc. The assemblage broke up at 2:30 a. m. and everyone went home.

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little girl was innocent of the charge by drawing the pain from the patient to her own body through the child. The shaman said that if the girl had been guilty she could not have drawn the pain through her.

[7] The shaman said she was "looking the pain over" before extracting it.

PREHISTORIC CAVES NORTH OF THE HIMALAYA

By H. DE TERRA

DURING my journey to western Central Asia in 1927–1928, I twice came across ancient cave dwellings. One is situated in the western K'un-lun range, south of the bazaar town Karghalik, the other lies in the Karakorum mountains in close proximity to the well-known caravan road which runs across the Karakorum pass and connects Chinese Turkestan (Sinkiang) with Kashmir. Both caves are deserving of interest as they not only show peculiar ancient rock inscriptions and drawings but are filled with a loess-like sediment that dates back approximately to the period when the youngest loess formation in that region was formed. As I did intensive geological work in the K'un-lun as well as the Karakorum and Tibet, I am able to describe with some degree of accuracy the geological position of the two cave dwellings, which differ greatly from one another. It was indeed the very striking geological position of the caves that enabled me to immediately recognize them as important witnesses of early human culture in regions where until now no one had noticed anything similar, and where no archaeologist would have dreamed of finding traces of very ancient human habitation. Indeed, the Karakorum cave is situated about 13,000 feet above sea-level, the K'un-lun cave at a height of 9,000 feet, both in mountainous regions which even today are looked upon as the most rocky and difficult ground on the earth's crust. In order to give a complete picture of the two caves I should like to describe each in detail, with special attention to their geological and geographical positions as they were observed by the author.

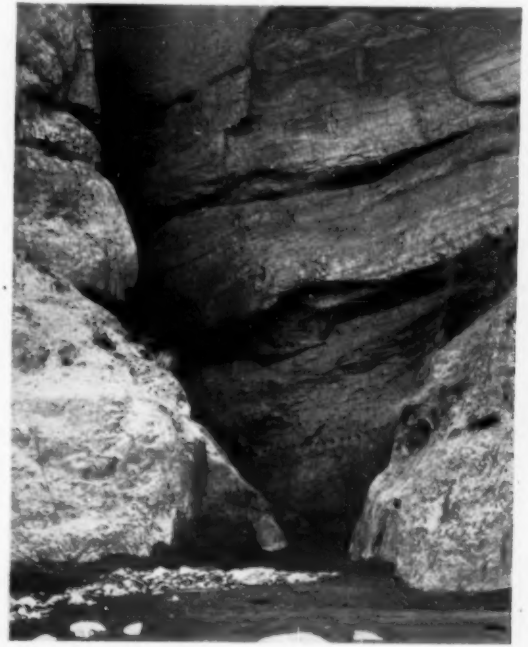
The K'un-lun Cave (*töshük-öng-oi*")

This cave was shown me by my native companion, whose home was Kök-jar, a small bazaar village two days march south from Karghalik (see map 1). With my small caravan I started from Kök-jar on April 4, 1928. After passing the Chinese custom office at Otun-su, I left the valley of Kök-jar traveling eastward on a trail which branches off from the caravan road leading to the Ak-korum Davan at a little hamlet called P'sar (erroneously surveyed on English maps as Pussa). Half a mile from P'sar one enters a valley which runs almost parallel to the neighboring Yaghaile valley, through which one of the main trade routes leads to Kashmir. I followed the course of this valley, called Köllkash by the natives, for about four hours, riding over soft loose ground, which here and there permitted agriculture on a modest scale. I camped at a place called "bash-

MAP 1. Sketch map showing the position of the caves in western Central Asia.

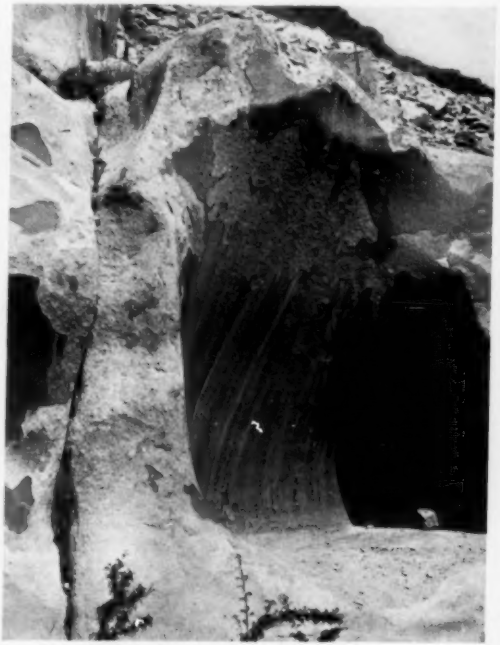
tekan" (five rivers), and the following day saw us marching southward again through the same valley, the end of which we reached very soon after a three and a half mile ride. This spot was marked by a couple of small huts and some fields; the shepherds who owned the ground called it Sekis-jar (eight valleys). Here the valley splits up into two smaller ravines. We followed the one running eastward and our way ascended quite steeply, leading us through the coarse gravel of the river. Now and then, however, while crossing small remnants of loess terraces, we met with softer ground and after an hour's walk from Sekis-jar, Mohamed Akkon, the guide who had come with me from Kök-jar, showed me the cave, which I shall now describe in detail.

The position of the cave is on the right side of the water-stream that flows down to Sekis-jar and the entrance lies about four feet above the present river bed. Plate 6*a* shows very clearly that the cave is of natural origin and has been formed by water erosion, as it lies exactly at the point where a small canyon ends in the ravine. As one approaches the entrance to the cave, or canyon, one leaves the gravel of the river-bed and ascends a few feet to a small terrace that consists of yellow clay mixed with gravel. At the entrance itself the steeply ascending rocky walls of the ravine bend into the little canyon, and here it is that the clayey gravel changes to a loess-like soil, which fills the bottom of the canyon. As one goes further the small canyon bends NNE, becomes narrower, and ends abruptly in a narrow cleft, which must formerly have contained a waterfall as its walls show every sign of water erosion. Thus the cave is actually situated at the point where formerly the outflow of the waterfall into the ravine took place. The total length of the cave is 33 feet and at its broadest point it measures 6 feet from one wall to the other. Directly in the middle, where the cave makes a bend, the walls are about 5 feet high and are covered with many carvings and inscriptions. In addition to this, the walls show a peculiar sort of brown polish, which I first took for the weathered surface of the rock but which on closer examination turned out to be a dirty and somewhat oily crust of the kind one observes in Tibetan stone huts or sometimes sees on the walls of prehistoric caves, where man or beast has rubbed against the rock. Very striking indeed was the fact that the ornamented and darkly overcrusted cave wall continued so deep under the loess filling that at a depth of two feet I had not nearly reached the proper bottom. While digging in the loess I did not, however, find any implement or any trace that could have given me a hint concerning the nature of the former inhabitants of this cave. I am, however, convinced that could I have dug to the bottom of the cave, I should have found the remains of meals or implements and primitive house-



a

The K'un-lun cave in the upper Köllkash valley. (The dotted line marks the upper edge of the cave as well as the boundary between the upper-lying loess and the ornamented cave wall.)



b

The Karakorum cave in lower Murgistang valley.

A section of the walls of the Karakorum cave with rock carvings showing hunting scenes.

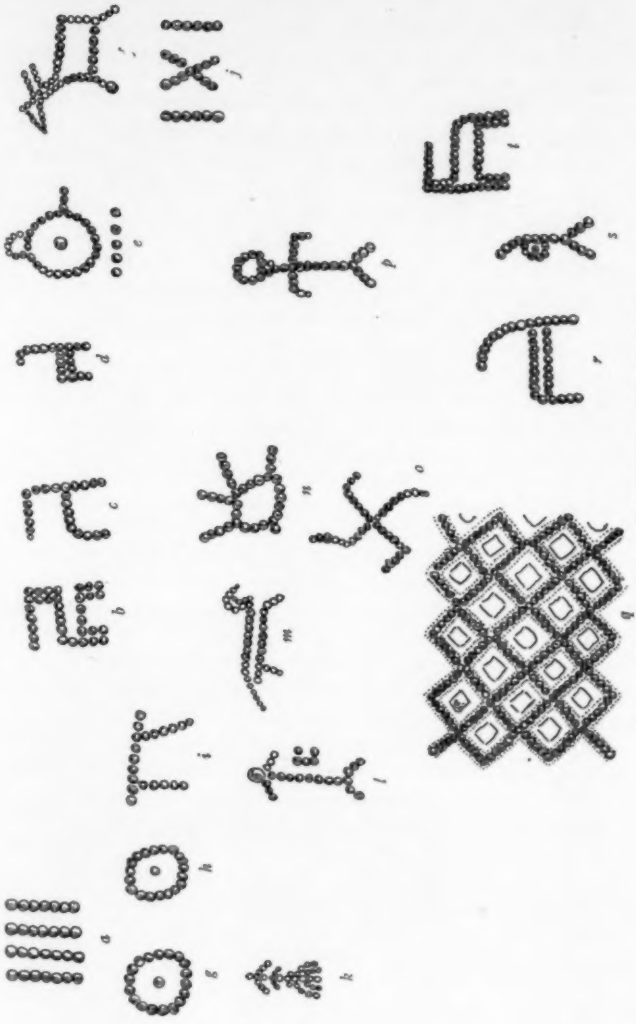


FIG. 1. Types of rock carvings in the K'un-lun cave.

hold possessions—but unfortunately this was impossible owing to the hostility and suspicion with which the Chinese officials controlled our work, at that time. For me there is some consolation in the fact that from the character of the rock carvings and ornaments, we are able to judge something at least of the standard of civilization under which these former cave-dwellers must have lived. In drawing our conclusions we cannot, however, be careful enough as it is well known how very primitive are the rock carvings with which the recent nomadic tribes (such as the Tādshiks in the Pamir)[1] describe their hunting adventures. In this case, therefore, it is most important to know how the carvings were made and what kind of instrument was used. In the first place, the rock that forms the walls of the cave is a pretty hard, siliceous limestone which must have been very difficult to carve. The characters, figures, and ornaments (fig. 1) are formed by small, smooth holes, 0.5–1 mm. deep and 4–5 mm. in diameter, set one after the other, as indicated in the figure. In the small squares of figure 1*q* deepenings are found, but these are not indicative of a method of carving differing from the other inscriptions. From the manner in which the various figures have been carved one can say that the instrument employed must have been exceedingly hard and blunt, most likely a stone or stone chisel. The uniform and regular shape of the pit-holes indicates furthermore that the material of the instrument was harder than the rock, which possesses approximately a hardness of 6½ degrees. The younger rock inscriptions which I have seen in the Himalayas near Kharboo or those in the vicinity of Tankse in Ladakh (about 900 A.D.) show quite a different manner of carving. They consist of straight cut lines which must have been made with sharp instruments; besides this they have been cut into the weathered surface of the rocks and do not show ornamental style as do ours. This latter fact leads us to another conclusion: that the K'un-lun cave sheltered a people who possessed enough artistic feeling to decorate their dwelling with ornaments and pictures. The ornament, shown in figure 1*q*, is not limited to one spot but runs at a certain height along the entire eastern wall of the cave, thus forming a broad band which makes the base rock vivid and more pleasant to look at. In one place the band-like ornament is interrupted by some other figures, two of which may be taken to be animals turning their heads backward (fig. 1*r*, *t*). Figure 1*p* could be a stylistic human body, but of greater interest is the sign to its left, figure 1*o*, the lying cross, which is strikingly reminiscent of the "svāstikāh" of the Buddhists. But if we accept this interpretation, we

[1] A. v. Schultz, Die Pamirtadschik (Giessen), 1914.

could with equal justice interpret the cross-like characters (fig. 1*l*, *k*) to be Christian crosses, which would certainly lead us to a wrong and rather peculiar conclusion. The only inscriptions which can be easily interpreted are the pictures of animals, figure 1*f* that of a horse or donkey, and figure 1*m*, a dog or wild beast of the canine type. All the other signs are for me more or less impossible or at any rate very uncertain to interpret and I should therefore like to leave the interpretation to readers better versed in the art of deciphering petroglyphs and old rock inscriptions.

As proof of the age of the cave I have already mentioned the peculiar primitive method employed in making the inscriptions. But far more important is its geological position. Up to two-thirds of its height, at least, the cave is filled with loess. It is not the pure type of loess which I found covering the Mesozoic and Tertiary of the northern slope of the range but more sandy and of the same type as the youngest loess which fills the broad valleys of the Sandshu or Kilian river and which very probably is of younger Pleistocene origin. In this latter type of loess we always find sand and pebble strata interbedded and it is originally derived from that mighty primary loess which once covered the slope of the northernmost range of the K'un-lun. I have already mentioned the few remains of loess terraces in the ravine and there is no doubt that the pleistocene loess once filled the entire ravine. The ravine itself was formed by younger erosion which doubtless also cut the deep canyon on the right side of the ravine. And it is evident that this canyon must have been completed and that its water stream must have dried out before men came and made the mouth of the canyon into their home. They settled in the dry canyon in front of the small river, which slowly deepened its bed in the ravine and more and more eroded the former loess filling. But eventually the cave-men deserted the cave and this seems to be best explained by the fact that the cave became filled with the loess material that rain or melting snow washed into it from the surrounding loess terraces which even now partly overhang the cave walls (see pl. 6*a*). Thus the cave with its rock inscriptions was covered with the youngest loess, the thickness of which I should judge to be between four and five feet. Unfortunately we cannot definitely state the age of this loess sediment but judging from the types of loess which I saw in the transverse valleys of the range, it must be of old alluvial or younger pleistocene origin.

The Karakorum Cave in the Murgistang Valley

Already in 1914 Mr. A. H. Francke[2] on his way from Yarkend to Leh in

[2] Durch Central Asien in die indische Gefangenschafft (Herrenhut), 1921.

Ladakh, came across a cave in the vicinity of the Nubra valley, of which he only mentions some rock inscriptions. I should not be surprised if that cave were the same I am now going to describe. It lies in the lower part of the Murgistang valley, between the Sasser-la and Nubra at the point where the path leads down to the bottom of the ravine. The path runs a few feet below the cave (pl. 6*b*) which can be easily recognized as an old whirlpool in the upper slope of the gorge. Whether it was formed during the last glaciation, when the Murgistang glacier was joined with the Nubra glacier, or whether it has been eroded by the torrent at a later date, is a very difficult question to decide,—at any rate the cave is partly filled with a loess-like clay. As the sedimentation of loess, according to G. Dainelli,[3] is limited to the glacial period and the period which closely followed, i.e., younger Pleistocene, there can be no doubt that this cave is very ancient.

The cave opens to the east and has a diameter of 6 feet, the rock is granite and its surface, as plate 6*b* clearly shows, is covered with a weathered, brownish crust, which is especially apparent on the inside walls of the cave. In this respect it is very reminiscent of the recent whirlpool holes which I saw in Himalayan river beds, all of which showed this lacquer-like brown crust. In this crust the carvings have been neatly cut (pl. 7), most of them depicting ibex hunters or riders, with every now and then a circle or a certain gate-like sign. The latter have very evidently been carved in a different manner and are made up of small holes like those in the K'un-lun cave, whereas the other carvings have been made by chipping off the brown crust. One immediately recognizes the considerable artistic standard of these hunting scenes. Especially well done are the ibex hunters with bow and arrow and the ibex themselves (likely *Capra sibirica*) with their long bent horns. These inscriptions are much better done than the ones in the K'un-lun cave, although the latter seem to me the more interesting because of their rather mysterious character. As in the first instance, these rock inscriptions continue below the sediment with which the cave is filled and are even to be found on a large stone which lies in the center of the cave. I examined the walls with especial care in search of any character amongst the inscriptions that could have belonged to a North Indian alphabet—like those near Tankse—but my search was in vain. The loess-like sediment was rather easy to dig in, and 1 1/2 feet below the surface I found a splinter of flint, pointed at one end and sharpened by little holes. I have no doubt that this was an implement as there was no flint to be found anywhere in the vicinity and the piece was artificially sharpened.

[3] Studi sul Glaciale, Records of the Italian de Filippi Expedition, v. 3, no. 2.

Relation to Ancient Settlements known to exist in the Neighborhood and Possible Age of the two Caves

Since the geological position of the two caves, as well as the peculiar character and technique of the inscriptions, leads us to conclude that they once sheltered an ancient race living under primitive conditions, we should investigate the question of the existence of similar or related settlements observed in that region or in its vicinity.

The best known rock inscriptions to the west of our region are those in the Russian Pamir. According to the observations made by A. v. Schultz, these are rather recent, having been made by the ancestors of the Tadschik (of Iranic origin) who even nowadays hunt the ibex with bow and arrow. These inscriptions depict exclusively hunting scenes and some few other characters which differ totally from the inscriptions shown in figure 1. The technique employed in the carving is also different, as those in the Pamirs are clearly and sharply cut out of the rock and in addition are not covered with loess. According to the German ethnologist Dr. Lenz, of the German-Russian Alai-Pamir Expedition (1928), the generation now living knows nothing of the origin of these rock inscriptions. To the north of the Alai near Osh, in the Ferghana basin, A. H. Francke[3a] has described rock inscriptions which seem to be of a rather ancient type as he compares them to those found in Ladakh. The same explorer mentions rock inscriptions existing near a caravan halting-place in the Karakash valley (map 1, cross above curve of river), called Pigle-tagash, and, as he found no traces of inscriptions between this place and Osh, he was led to the conclusion that the Pigle-tagash inscriptions already belonged to the Tibetan type and that in this part of Chinese Turkestan no caves or traces of such ancient settlements exist. That this conclusion was premature is evident, and we can actually prove that the K'un-lun inscriptions and those known in Ladakh (Little Tibet) differ fundamentally from each other. As I have already mentioned, the Tibetan rock carvers used a different technique and besides the inscriptions show distinctly the characters of an old language, the Soghdian, which even permits us to decipher the inscriptions that tell of an old settlement of Nestorian Christians about 800 A.D.[4] The only rock inscriptions that we can with some reason compare with the ones described above are the ibex hunters of Kharboo in

[3a] A. H. Francke, Felsinschriften in Ledakh. Sitz. Ber. d. preuss. Ak. d. Wiss. phil.-hist., Kl. 31: 132.

[4] A. H. Francke, Felsinschriften in Ladakh (Sitz. Ber. d. preuss. Ak. d. Wiss. phil.-hist., Kl. 31: 366) and F. W. K. Mueller, Eine soghdische Inschrift in Ladakh.

the northwestern Himalaya, a day's march from Dras.[5] Here we have the same hunting scenes as those in the Karakorum cave but they are carved on a big stone on the old caravan road to Ladakh and do not belong to a loess-covered cave; furthermore, the manner of the carving is more modern and has probably been done with sharp instruments

Unfortunately I was unable to visit the rock inscriptions mentioned by Francke, in the Karakash valley, so that I am unable to say decisively whether they show the same characteristics as those in the cave Töshük-öng-oi, but according to what I have been able to learn both from personal and literary studies, the cave in the Köllkash valley and the other one near Nubra represent a special type, hitherto unknown in these regions. But if we look toward the east, in the farther K'un-lun, to the province of Kansu which borders on Chinese Turkestan or Sinkiang, we meet with very ancient and, what is very important, loess-covered human settlements. Here the most striking and interesting prehistoric discoveries have been reported recently by Andersson,[6] and the ornamentation on the pottery of that ancient race shows without doubt a distinct style which entitles us to compare them with some of the signs shown in figure 1.[7] In fact, our knowledge of the cave in the K'un-lun and the one near Nubra may lead us to the conclusion that there are traces of ancient culture in western Sinkiang, traces which may lie scattered all over the country and which are waiting to be discovered by the scientist-explorer. In this connection I should not forget to mention a find of ancient loess-covered pottery that Francke discovered near Sanju (see map 1), southeast of Jarkand, which may give a further hint to future explorers and travelers who will search for traces of ancient human culture in the very heart of Asia.

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[5] Several of these rock inscriptions have been described by Dainelli and Biasutti in their work, I Tipi Umani (Sped. Italiana de Filippi, ser. 11, vol. 9, table 16, 19, fig. 2 and table 16, fig. 1).

[6] Preliminary Report on Archaeological Results in Kansu. Memoirs of the Geological Survey of China, no. 5, Peking, 1925.

[7] Especially the animal figures, pl. 3, fig. 2, and the ornament on pl. 7, fig. 2.

TWO MIMBRES RIVER RUINS

By EDITHA L. WATSON

THE ruins along the Mimbres river offer material for study unequaled, so far, by any other ruins in southwestern New Mexico. However, as these sites are being torn apart by pot-hunters, the notes which have been made in the course of some few scientific investigations are doubly valuable.

Notes have been made on two ruins, about twenty miles apart. These are known as the Gonzalez place, which is located near San Lorenzo, on the upper Mimbres, and the Golass place. This latter location is the one[1] which Dr. J. Walter Fewkes describes as "where the rocks come down to the river." It is also known as the "Dam Site." These names refer to a ridge of rocks which crosses the river at this point.

While the method of construction of these two ruins varies considerably, both of them are built over the walls of earlier houses, and part of the Gonzalez ruin is built over two layers of walls in this manner. Since these houses were in ruins at the time of the Conquest, one may safely attribute considerable antiquity to the lower layers, and the pottery from the third stratum of the Gonzalez place may be considered archaic, as it differs from that found above it, and is of the thick, black, coiled or plain ware considered to be very early.

Pottery found in the second stratum of the ruins resembles that in the upper rooms, and may, therefore, have been intrusive. From the manner in which the two uppermost strata have been dug over, it is impossible to state accurately more than the above.

Little work was done, at the time of the writer's visit, to the lowest stratum at the Gonzalez place. The weather was extremely warm, and only a small hole, barely large enough for one man to dig in, was made to this depth. The hole was sunk along a wall of the top room, and penetrated through two distinct floors, several feet apart. The few pieces of pottery found at the bottom of this hole were as described above, and in very good preservation.

Both the ruins considered in this paper are situated at some distance above the river, on the level of the present road. However, the Gonzalez ruin appears to have always been above the level of the water, while at the lower ruin the river has risen at times above the bench on which the houses are located and has covered them, then receded into its usual channel, some twenty feet below. This is not unusual with mountain rivers

[1] Archaeology of the Lower Mimbres Valley. SI-MC, vol. 63, no. 10.

and evidently did not happen often enough to drive the Indians permanently from their homes. In one of the rooms on the upper level, a skeleton of an Indian was found who had been caught in one of these floods. The body had been driven against the wall of the room, so that the head was turned back at a right angle to the body, which was lying on its stomach. River mud, sand, and debris had packed around it and held it in this position. From the arm of this skeleton, twenty-one shell bracelets were taken.

In the last thirty years, a house has been built on this site, the builders

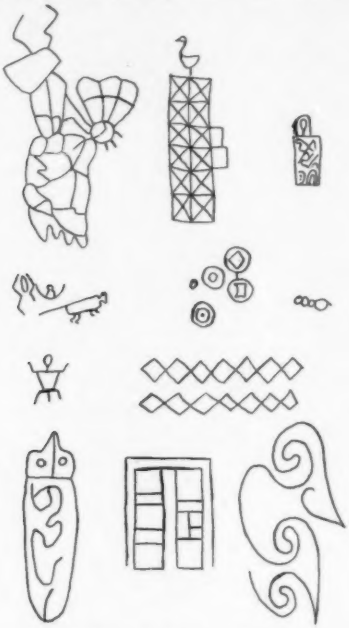

FIG. 1. Petroglyphs from Golass ruin.

utilizing the rocks strewn on the surface of the ground, which were once part of the walls of the ruin. Since this house was built, the Mimbres has risen until it covered the roof. To see it in the summer, a feeble, narrow stream, this appears almost unbelievable.

No petroglyphs or pictographs have been discovered at the Gonzalez ruin, but at the Golass place there is a bluff of considerable size behind the ruins, and this bluff is thickly engraved with petroglyphs. These inscriptions are of great variety and interest, and in some places are superimposed

over each other. Some of the designs are very realistic, while others appear to be meaningless scrawls. (See fig. 1.)

Many rocks in this place have been used as mortars and mealing pits, also. One can stand on the bluff, overlooking the ruins and the river, and imagine the scene: the women busy grinding corn in the shelter of the bluff, the activity of pueblo life, and the hunters and fishermen returning with their spoils from across the river.

The builders of the Golass ruin used more care than those of the Gonzalez place. The upper ruin is made of plastered adobe, with large rocks set in the walls. A mortar with the orifice opening into the room was placed in this way. The floors were of hardened earth.

At the Golass ruin, on the other hand, the plastered walls were more carefully made. The floors were formed of thin slabs of rock or layers of charcoal. One room had a banquette on one side.

FIG. 2. Bowl from room with banquette. Golass ruin.

(The above discussion concerns the upper layer of rooms only.)

The Gonzalez ruin was indicated on the surface by a low mound. The pottery from this ruin, while resembling that from the Golass place very closely, showed more variety. A red ware, incised in geometrical designs, has not been found elsewhere. This incised ware is thin, beautifully made, and the decoration was carefully applied.

From this ruin was taken an effigy jar, with the body of a duck and the head of a hawk.

The Golass ruin was so badly dug over that its former outlines were destroyed. Pottery found in this ruin did not include effigy ware or incised ware. However, painted ollas with concave bases were found here. (The concave base is a very rare form.) Also found in this ruin was a

bowl which had been pressed, while the clay was still pliable, into a four-sided shape. This bowl was found with an interment. (See fig. 2.)

Some of the pottery from this ruin was so thickly encrusted with a lime coating that the design was completely hidden.

Pottery with human and animal designs is not rare in either ruin. An occasional piece in three colors is found, but for the most part two colors are used, and of these black and white are by far the most prevalent.

FIG. 3. Designs of bowls used in cremation burial.

Two very interesting cremation burials were found at the Golass ruin. One of these consisted of calcined bones in a small bowl about six inches in diameter. This bowl rested in a slightly larger one, and they were covered with a still larger bowl with a geometrical decoration. With this group was found a small coiled ware jug with a handle. (See fig. 3.)

In the other burial, the calcined bones were placed in a small bowl with a lizard painted in it. Inverted over this was a smaller bowl with a quail design, and these rested in a larger bowl with a fish decoration. This group of bowls and a mano were found on a metate which had been in a fire as it was blackened and broken into three parts from the heat, and the mano was also blackened. Near these was a broken corrugated olla, which

FIG. 4. Designs on two of the bowls used in cremation burials. The design on the third and smallest bowl is nearly worn away and so cannot be properly copied.

had been "killed"—a small hole drilled through the side—and burned. This burial was found in the room with the banquette. (See fig. 4.)

These two cremations are the only ones recorded from this region, and are of especial interest on that account.

It is to be regretted that these two ruins could not have had scientific excavation.

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NOTES ON HOPI CEREMONIES IN THEIR INITIATORY FORM IN 1927–1928

By JULIAN H. STEWARD

None of the three regular winter ceremonies of the Hopi of First Mesa has been fully described—Wöwöchim, Soyala (Winter solstice ceremony), Powamu (the Kachina ceremony)—in its long or initiatory form. Wöwöchim is the tribal ceremony into which every youth is initiated. The year this initiation is held the ceremony is extended, as are also the following Winter solstice ceremony and the Powamu ceremony. In the winter of 1891–1892 the extended ceremonies were held, and Alexander M. Stephen described[1] the Wöwöchim (Naashnaiya), but failed to see the initiatory rituals. The Winter solstice ceremony of this year Stephen does not describe excepting the dramatization which occurs the final night in Chief kiva.[2] As for the Powamu of 1892 only part of the ritual which occurs on the last day—the extra day of the extended form—is described by Stephen.[3] The whipping of the children in the kiva he did not see.

After 1891–2 it is not known when the initiatory forms were observed, if at all,[4] until the year 1927–1928. When I was on First Mesa in 1920, observing the Wöwöchim in its non-initiatory form,[5] I was told that Hani (Lesma), the Singers society chief, who is chief of the Wöwöchim ceremony, was too old to conduct the long ceremony and that he had not trained any kinsman as assistant. Two or three years later, Hani died; in 1925 I was told that a successor was found and that the following year, 1926, the extended ceremonies would take place. Actually, they took place a year later, and Dr. Julian H. Steward of the University of California visited First Mesa in February, saw parts of Powamu, and got accounts of what he did not see, as well as of the preceding ceremonies. His notes follow.

E. C. PARSONS

WÖWÖCHIM

THE ceremony is announced by the Crier chief during the first quarter of the Kele (sparrow hawk, novice) moon (November). Hoñi of the Snake clan is still Crier, but being blind,[6] he has as a substitute his brother, Harry

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[1] J. W. Fewkes and A. M. Stephen, The Nāācnaiya: A Tusayan Initiation Ceremony. JAFL, 5: 189–220, 1892.

[2] Hopi Journal (in proof).

[3] *Ibid.*

[4] In 1916, when Dr. Lowie visited First Mesa, he learned nothing definite about dates of celebration in extended form. I surmise that after 1916, perhaps for some time before, no such celebration was made.

[5] E. C. Parsons, The Hopi Wöwöchim Ceremony in 1920. AA, 25: 156–187, 1923.

[6] Cf. E. C. Parsons, A Pueblo Indian Journal. AAA-M, 32: 97, 116, 1925.

Supela. Námuki, Hani's sister's son,[7] or sister's daughter's son,[8] is now Singers' chief.

In Chief kiva the new fire was made with the fire drill by Dewówüna, of the Kokop clan (Cedarwood-Coyote-Masaû clan, referred to in English as the Fire clan).[9] The fire is carried to all the kivas, where it must not be allowed to go out during the subsequent ceremonial.

New details[10] were given about the trips for soap-weed and greasewood undertaken by the novices. The novices of Singers, Wöwöchim, and the Horn society with a leader referred to as "Alosaka" together descend the mesa to the south. Alosaka draws a line of corn meal, which is to be the starting line. As the boys come up, he asks, "What is your name?" Each boy tells his name. He then says, "Now boys, if you catch me before we get to that mountain, Sistávatekwi (a butte twenty miles or so to the south), we shall come back again. If you do not catch me, we will run all the way there. You must stay here until I get to that point." And he indicates a point about a mile and a quarter away.

Alosaka departs, and when he reaches the point indicated the boys start in pursuit. Usually he is overtaken within ten or fifteen miles. As each boy overtakes him, he is seized and held until the others arrive. Alosaka may say, however, that he was just practicing and in that event another short race takes place. If he is soon overtaken the second time, he generally yields and they stop. At this time they have a light lunch of sweet corn meal dough which one of the boys has carried. A man on horseback has brought them water.

After eating they turn back to the mesa. All must run, picking soap-weed as they go. The boys must continue to run, even though exhausted. Each is accompanied, however, by two men, usually his father and uncle who care for him. As the boy picks the soap-weed he hands it to his father or uncle, who rolls it up and returns it to him to tie around his waist. The boys may not all arrive at the mesa before sundown.

At the line of the start each has deposited his ritual corn ear and the place has been left in the charge of some old man. When the boys return, they pick out their ritual ears from the pile and proceed to the mesa and

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[7] Hopi Journal.

[8] R. H. Lowie, Notes on Hopi Clans. AMNH-AP, 30: 314, 1929.

[9] Fire is made by two Agaves and two Horns (Fewkes and Stephen, 194–5).

[10] Dr. Steward was also given an account of the initiation ritual proper which was described as like that of Powamu with a kachina sand painting and whipping by the Tunwub kachina. The account seems to me questionable as at this season kachina do not appear in Walpi.—E.C.P.

back to their kivas. No one may eat, however, until all have returned. Then the boys may go to their own houses for an ear of white corn and bring it back to the kiva to eat, kernel by kernel.

That night each boy has his hair washed by his "father" with the soapweed brought in. While this is being done the boy stands on a sand painting of clouds.[11] He is not allowed to fall asleep until each boy in the kiva has had his hair washed. That night all the women in Walpi must leave the town and find lodging in Sichumovi or Tewa. After the boys have had their hair washed, they leave their kivas and walk about Walpi "talking to bring them good luck." Two boys impersonate whirlpools and whirl their bodies around as they walk. All night the boys must continue to walk through the village, taking short rests, however, at intervals.

The following day the "fathers" of the boys who have been in the race commence to make moccasins for them.

While the novices of the Singers, Wöwöchim, and Horn societies have been racing, the Agave novices in Goat kiva have been required to remain in kiva all day. There they must sit against the wall, legs drawn up close to the stomach and arms flexed over the chest, wrapped tightly in a blanket. All day they must sit in this position and only when all of the racers have returned are they permitted to stand up and stretch themselves, when they are rubbed.

Two days after the racing trip for soapweed, the Agave novices have a race. This is to secure wood. Below the mesa on the east side is drawn the meal line. This time the boys are to be pursued by the old members of the Agave society. Each boy is held by his "father" until the signal to start. All start together. It is said that if some of the boys are good runners they may run fifteen or twenty miles before all are caught.

When all have been overtaken, they start back. On the return all walk, the boys picking up greasewood, which they carry on their backs. When they arrive at the mesa, they ascend by way of Tewa and proceed directly to Goat kiva.

The last night of the ceremony there is a fire dance in the court by the Agaves. Wood has been collected from each house for the fire. After sundown, as dusk[12] is approaching, the Agaves come out to dance. Their dance starts in the kiva, where they first stand in a circle, each man interlocking fingers with the man next to him. They must take great care not to lose their hold lest they have bad luck. In this way they proceed slowly up the

[11] Not observed by Stephen. See Fewkes and Stephen, 206.

[12] Dawn (Hopi Journal).

kiva ladder, to the plaza, and around the fire four times. They continue with interlocked fingers. They must proceed with great caution lest any man lose his grasp of his neighbor's hand. The dance is slow and deliberate and it is nearly dawn when the men are back in kiva.

Early the following morning the novices are taken by their ceremonial fathers to his (the "father's") mother's or sister's home. His mother and sisters wash the boy's hair and put corn meal on their own faces. They give the boy a kömi (a cake about 18..6x2 inches of sweet corn meal ground fine and made into dough). They also present him with a blanket or shirt, pants, etc., place the kömi on his back, and take him home to his own parents.

At this time the boy's mother must commence to grind blue corn into meal. When she has ground the equivalent of a tubful, packed solid, this is put into a container or tub and a pot is buried within the meal. This is returned to the "father's" mother and sisters, who have given the boy presents.

Winter Solstice Ceremony

Auhalani, the kachina of the Patki clan who appears in this ceremony, a ceremony in charge of the Patki clan, was impersonated by Mauwa.[13] When he died his nephew, Givina, was too young to take his place, so Givina's father, Náto of the Denyo (Pine) clan,[14] has been substituting for him since 1924.

The blue corn ears in the basket trays carried by Auhalani's sisters in their public dance are given to Güya[15] and Yuna[16] of the Patki clan (Corn lineage). They place the ears on top of the corn store in their own houses "to bring the people good luck."

Powamu

Although the Powamu ceremony is regarded as commencing with the first appearance of the new moon in the latter part of January or the first part of February, it is anticipated some time before this,—at approximately

[13] Or Mawa. Patki clansman, and Sun chief or watcher. He died in 1924 (A Pueblo Indian Journal, 14). His uncle was Sikyaustiwa, who impersonated Auhalani in his day except when he was lame, when his son impersonated for him. So here we see in this impersonation of Auhalani at different periods a son impersonating for his father and a father impersonating for his son, both impersonations of course falling outside of the clan—temporarily.

[14] A lineage of the Tewa Bear clan.

[15] Lalakon chief, daughter of Koyanumka, daughter of Kwumawunsi. (Hopi Journal.) According to Lowie, 316, she is an adoptive daughter, actually of the Greasewood lineage of the Reed clan.

[16] Lalakon chief. Another granddaughter of Kwumawunsi. (Hopi Journal.)

the preceding full moon. At this time Dalauwine,[17] the Kachina chief, plants a box of corn[18] in Chief kiva. This corn is to be carefully tended[19] and is for Ahül kachina to distribute during his "rising" several days after the beginning of the ceremony.

January 22. On this day the new moon appeared. Kachina chief looked for it, but was unable to see it on account of clouds. He must actually see it.

January 23. The Kachina chief looked again for the moon and was successful in seeing it. This day[20] is not counted as part of the ceremony. The following day is the first day.

January 24. 1st day. On this day the chiefs have their hair washed and then enter Chief kiva, where they are to stay and take their meals during the following sixteen days. Among those who enter Chief kiva are Kála, Kachina chief, and Daláuwine, the brother who substitutes for him, Hó'oŋi, Crier chief and chief of Snake clan, and Harry Supela, his brother (cousin), who substitutes for him as Hó'oŋi is blind, Aŋa, the Sun watcher,[21] Námuki, Singers chief, Múkto, head of Horn kiva, Lé'eteo,[22] impersonator of Ahül kachina.

Prayer-stick Making Ritual

At night is performed the "raising up of the sun" in Chief kiva.[23] The part of Ahül, the Sun kachina, is taken by Lé'eto of the Rabbit clan. Ahül lies down late in the evening and then slowly commences to raise himself, singing as he is doing so, and putting on his mask. It takes all night for him to rise.

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[17] The office of Kachina chief, i.e., chief of the Kachina or Powamu society, is filled by the chief of the Kachina clan. Siwanekála or Kála is actual head of the Kachina clan and should therefore hold this position, but, as he is blind, the active duties are performed by his brother, Daláuwine. According to my informant the brother has preference over the nephew in matters of substitution and succession.

[18] Beans. The corn is planted in the house of the Kachina clan mother. (Hopi Journal.)

[19] Presumably the growth is an omen of the coming season. (See A Pueblo Indian Journal, 34.)

[20] In the evening, the smoke talk which in 1893 was in the maternal house, not of the Kachina chief, but in that of the Town chief (Horn clan chief and chief of the Flute society). (Hopi Journal.)

[21] Patki clansman, older brother and successor to Mawa, after 1924. In 1920 Anga was referred to as a rain chief, performing a secret undescribed ritual with the chief of the Winter solstice ceremony, also a Patki clansman. (See A Pueblo Indian Journal, 81, 87, 88, 89.)

[22] Presumably Letaiyo, Tobacco (Rabbit) clansman, son of Intiwa formerly Kachina chief. (Hopi Journal.)

[23] Not observed by Stephen.

January 25. 2nd day. At daybreak Ahül kachina is accompanied by Daláuwine, Kachina chief, to the Gap north of Tewa. Here he dons his mask again and lies back against a rock facing toward the rising sun. As the sun comes up, he slowly raises his body, so that by the time the sun is above the horizon he is standing erect.

Daláuwine then conducts Ahül through the mesa, going ahead of him and sprinkling corn meal on the ground from a plaque. Ahül carries a fox-skin bag filled with corn meal, a hooked cane (because he is supposed to be very old), and the corn (and beans), which were planted in the middle of January.[24]

These two proceed up the road from the Gap to Tewa. The places visited[25] are as follows:

1. Pendete (the corner kiva, Tewa).
2. Bear clan house, Tewa (where Satéle, Tewa Town chief lives).
3. Corn clan house, Tewa (owned by Námpaño, a woman).
4. Tobacco clan house, Tewa (owned by Ókan, a woman).
5. Kisuŋ or Court kiva, Tewa.
6. Corn clan house (owned by Hé'le, sister of Alan[26]).
7. Bear clan house, Tewa (owned by a young woman[27]).
8. Cloud clan house, Tewa (owned by Boléhuŋka, sister of Sa'ípa,[28] a man).
9. Stove kiva, Sichumovi.
10. Butterfly kiva, Sichumovi.
11. To a rock at the south end of Sichumovi.
12. Goat kiva (this and the following in Walpi).
13. Horn kiva.
14. Horn clan house.[29]
15. Nasava'[e] kiva.
16. Wikwalvi'[i] kiva.
17. Chief kiva.

Ahül performs rites at each kiva and house visited. At Corner kiva of Tewa, the first visited, he climbs to the roof. Standing to the east of the

[24] Compare J. W. Fewkes, Hopi Katcinas, BAE-R, pls. 7 and 21; A Pueblo Indian Journal, fig. 16.

[25] Aside from the kivas, these are the houses in which the society tiponi or supreme fetiches are kept, the maternal houses of the society chiefs. Compare list of places visited in 1920 (A Pueblo Indian Journal, 47–48).

[26] In 1920 Corn clan chief and chief of Court kiva (A Pueblo Indian Journal, 113). In 1893 prayer-stick making for the Tewa clown society was held here. (Hopi Journal.)

[27] Here is kept the Bear kachina mask, the old man (wöye) of the Bear clan. (A Pueblo Indian Journal, 47.)

[28] Probably K'elang, chief of the Sumaikoli society. (*Ibid.*)

[29] Maternal house of Tü'ünó[e], the Town chief and chief of the Flute society.

hatch facing the opening, he bows down four times very slowly, saying "ha ᵒᵒᵒᵒᵒᵒᵒᵒᵒᵒ" in a falsetto which lasts to the limit of his breath. After this he takes a handful of the finely ground white corn meal from his sack and, bending down, pastes it on the lower side of the hatch. The kiva chief then comes out and sprinkles corn meal toward him four times, gives him four prayer-sticks, which the men in the kiva have made for him, and receives one of the nine bundles of corn (and beans) carried by Ahül.

This ritual is repeated at each kiva. Where, however, there is a Tobacco clan man in the kiva, he comes forth with the chief of the kiva and, standing in front of Ahül with a pipe, blows smoke toward him four times. At Corner kiva there is no Tobacco clan man. Both Corn and Tobacco clans, however, are represented at Court kiva, and also at Stove kiva, Sichumovi, so that the double ritual is performed at these kivas. At Corn clan house, the owner of the house sprinkles corn meal on Ahül four times, and at Tobacco clan house a man blows smoke toward him four times.

At each house Ahül pastes corn meal on the door, taking it in the palm of his hand and rubbing it from near the bottom of the door upward. The owner of the house then sprinkles corn meal on him, presents him with one prayer-stick, and thanks him. After Ahül has left, the corn meal is removed from the door and each householder rubs some of it on his face "for long life."

When Ahül arrives at his eleventh stop, the rock at the southern end of Sichumovi, he bows four times and sprinkles corn meal as he has done at each house. This is for the houses to the north, in Sichumovi, from which the people then come to sprinkle corn meal on him and to present him with prayer-sticks.

At the house of Tü'üno'ᵉ, Walpi Town chief, corn meal is sprinkled on Ahül and smoke blown toward him from a pipe, as there is always a Tobacco clan man in this house.

At Chief kiva, Ahül makes his final stop and performs the same ritual as at other kivas. First the Kachina chief, Kála, comes out of the kiva with the vessel of medicine water, which he sprinkles to the east, south, west, north, zenith, and nadir. Then Námuki, Singers chief,[30] comes out and blows smoke toward Ahül as has been done at other places visited where a Tobacco clan man is present. After this, Ahül is given four of the prayer-sticks which the chiefs have made on the first day in Chief kiva. The remainder are buried in the corn fields the following day, excepting four sticks kept permanently by Kachina chief which he repaints black each year.

[30] This ritual is performed by Námuki, not as Singers chief, but as Tobacco-Rabbit clan chief.

His tour of the mesa thus completed, Ahül descends to Kuwá waimuvek'e,[31] where he bows four times toward the sun and places the prayer-sticks on the shrine with the prayer: "Give my children good luck, long life, happiness, health, good crops, etc."

On this day the planting of the beans commences. Every member of each kiva plants his own box of beans. These represent the corn fields and are omens for the coming crops. In order that those who are away at this time or for any reason are unable to plant may have the opportunity to do so, a period of four days of planting is allowed.

Pots, boxes, tin cans, or any convenient small containers are used. The sand for the purpose is procured from a sand slope, which now supports a small orchard of peach trees, east of Tewa just below the wagon road which ascends to the mesa. The beans are covered with one half to one inch of soil, watered regularly morning and evening, and carefully tended. Each man cares for his own beans, but all fetch wood, as the fire must be kept up to keep the kiva continuously warm.

On this day the chiefs in Chief kiva take the prayer-sticks made on the first day which are not already disposed of and bury them in their corn fields.

Many of the kiva members may now commence to weave, making kilts, sashes, and girdles for costumes to be worn in the kachina dances.

January 26–28. Beans may be planted.

February 1. 9th day. On this day (which is eight days after the beans have first been planted), Hahái'i wuqti[32] and the Natá'aska[33] kachinas go around.

Daláuwine, acting Kachina chief, announces on this day that four days hence the children are to be whipped in their initiation to the kachinas.

The members of all the kivas commence to practice their songs and dances for the "Bean dance," Powamu kachina dance, which is to be held during the last night. The dancing is in the nature of a rehearsal and is done without masks.

The kiva members also commence to work on the presents—figurines, rattles, moccasins, etc.—which are to be distributed to the children on the morning of the final day.

Sufficient wood is now brought into the kivas to last until the end of the ceremony.

The children are taken into the kivas by their ceremonial fathers about

[31] Shrine at the southwest point of mesa.

[32] Compare Fewkes, pl. 7; A Pueblo Indian Journal, fig. 18.

[33] Compare Fewkes, pl. 9; A Pueblo Indian Journal, fig. 19.

three or four o'clock in the afternoon. The "father" is a man in any clan other than those of the child's true mother and father, to whom the child is "given" by his mother. The same "father" sponsors him in the Wöwöchim ceremony.

The "father" goes first to the boy's house and takes him to his own. Here he has made a small prayer-stick of four feathers tied to the end of a stick. He next selects a perfect ear of corn, to the end of which he fastens the prayer-stick. This is given to the child to carry. They now proceed to Chief kiva, where the chiefs have assembled.

As the children descend the ladder, a man stationed at its foot grasps them under the arms before they step on the ground; taking them in his arms, he passes them to a man at his right. In this manner they are passed along the western wall of the kiva to its southern end, and across the southern wall to the southeast corner. Here they are placed sitting on the floor in a row along the wall. When there is no more room along the southern wall, they are set along the western wall from south to north.

In the center of the dance space of the kiva is a sand painting of Dü′mas[34] kachina and her two sons, Duŋwup[35] kachinas. This is surrounded by a rainbow in the shape of an arc. In front of the sand painting is a square pot of medicine made of hóŋ!api roots.

Meanwhile three men who are to impersonate Dü′mas and Duŋwup kachinas have descended to Kuwáwaimüvek'e, where they dress.[36] The Duŋwup kachinas each carry willow switches in their right hands. Dü′mas kachina carries a plaque of corn meal. When they are ready, Dü′mas kachina calls to her children in a loud voice that may be heard on top of the mesa, "We are going up on top of the mesa to see our people. We are going to the kiva to see the children who do not obey their parents." Dü′mas kachina now walks rapidly, followed by her two sons who trot with short steps. When they arrive at Chief kiva, they go around it four times clockwise, and then enter. Inside the kiva they make a circuit four times in the same direction. The fourth time around, Dü′mas kachina stops at the ladder "so that nobody will run out."

When Dü′mas and Dúŋwup kachinas come to a stop (the latter, however, continuing their trot as a sort of mark-time), Kachina chief asks them why they have come. Dü′mas kachina motions toward the children and says, "They do not obey their mothers and fathers. We are going to help you old people so that they will mind you." Kachina chief replies, "Of course they

[34] Compare Fewkes, pl. 7; A Pueblo Indian Journal, fig. 21.

[35] Compare Fewkes, pl. 7; A Pueblo Indian Journal, fig. 22.

[36] These parts are taken by any members of Chief kiva.

do not mind us. But I would rather be on my own children's side than on your side. They do not mind us, but I will take care of my children." Dü′mas kachina insists, however, that the children must be made to obey, and Kachina chief yields. But he asks them not to use the willows to whip the children. The kachinas consent to this and yucca blades, which have already been brought to the kiva for the purpose, are substituted. Kachina chief then says, "They do not mind us, so we will let you try to make them obey. We will let you force them to keep these things a secret [i.e., the initiation]. But you have to whip me before you can do it to my children." Kachina chief now steps to the middle of the sand painting and faces toward the north. One Duŋwup kachina stands in front of him, the other behind him. He bows and the one to the south strikes him on the back four times with the yucca whip, whirling the whip above his head after each blow. The Duŋwup kachinas then change places, and the other whips him in this manner.

The whipping of the children now commences. The first child to enter the kiva, i.e., the one sitting in the southeast corner, is taken first. He steps to the painting and faces toward the north. His "father" stands in front of him and as the child bows, his "father" leans over him and grasps him around the body under the arms. The Duŋwup kachina standing behind the child, to the south, now whips him four times, whirling the whip after each blow. Each time he is whipped, his "mother"[37] sprinkles corn meal toward him. As the Duŋwup kachinas change around, the "father" takes the child's place and is whipped four times by the other Duŋwup. Kachina chief then comes forward and gives the neophyte four drinks of hóŋlapi in a scallop shell. The neophyte now returns to his seat on the floor and the next child steps forward to be whipped.

After the last child has been whipped, four or six Goyemshi kachinas come out of a door in the southwest corner of the kiva. They have gone in there before the ritual commenced and remained hidden throughout. The Goyemshi carry corn tied into bundles of four. One bundle is given to each child.

Kachina chief now takes the whip from the Duŋwup kachinas and says, "This is the way we initiate to the kachinas. You children must not tell how this thing is done to other children who have not been initiated. If you do tell, these kachinas will come around to you and whip you until they cut your flesh." The children have been well frightened and never tell.

The "father" of each neophyte now takes one of the four feathers from the ritual ear and stick which the child still holds and ties the feather to the

[37] His "father's" wife.

top of his head. Kachina chief tells them that they may not eat salt for four days. Early in the morning of each of the next four days the initiate takes one of the feathers, together with some corn meal, and goes to the shrine at the head of the trail leading down the mesa from Sichumovi. The corn meal is held close to the mouth and addressed: "Give me long life so that I may become very old. Give me happiness. Always keep sickness from me." The corn meal is then placed on the shrine. The feather which was tied in the hair is also deposited, and the child runs back to his house. Another feather is then taken from the ritual ear and stick, and tied on his head. This performance is repeated at dawn for four mornings. As the last morning is the one before the "Bean" dance, the child must make his offerings and prayer to the shrine before the kachinas appear to distribute presents.

Henceforth the boys may take part in the kiva activities and impersonate kachinas.

After the whipping of the children, Kachina chief gives Dü′mas and Duŋwup kachinas each a handful of turkey feathers, which he tells them are clouds and requests them to "take these home to their people and ask them to send rain and good crops." The kachinas take the feathers and leave the kiva, circling it four times, the Duŋwup kachina still trotting (which they have continued throughout the performance), and then go down to Kuwá-waimuvek'e. When they arrive, Dü′mas kachina places the feathers on the shrine and addresses a prayer to the Clouds: "Here, we have brought you these feathers which our fathers handed to us to ask you to bring rain to the crops and make them grow." The Duŋwup kachinas then place their feathers on the shrine and say the same prayer. These three kachinas now disrobe, wrap their costumes and masks in blankets, and return with them to Chief kiva.

In the evening the kiva members practice the various kachina dances, especially the maskless Powamu kachina. Two of the kivas, however, do masked kachina dances, dancing at each kiva.

It is said that when the kiva groups make the rounds to dance they are "visiting to see how the plants (i.e., the bean sprouts) are growing." When they arrive at each kiva, they may be heard talking and muttering in a falsetto. The head of the kiva then calls, yúŋya-ai (come in) and is answered by "hu-hu-hu-hu" in a falsetto. As the dancers enter, they always pass around to the right, i.e., the west, of the ladder, where someone sprinkles corn meal after each man. The leader of the dancers presents to the head of each kiva a perfect ear of blue corn. These ears are kept by him for planting. As the dancers pass around the end of the kiva where the beans are growing, they shake their rattles just over the tops of the sprouts.

One group of dancers came from Kisuŋ kiva[38] and impersonated Sio (Zuñi) Humis kachina.[39] There were no female impersonations. The dancers entered the kiva, filed around to the right of the ladder, and took their places around the wall in the dance space to await the signal to commence the dance. The signal was given by the leader, who stood in the middle of the row of dancers and shook his rattle vigorously. The step was executed in double time, the left foot being thrust out, the right foot lifted several inches above the floor. The dancers shook rattles carried in their right hands to the time of the music.

Another group of dancers from Horn kiva made the rounds of the mesa and impersonated Ma kachina.[40] The masks of Ma kachina had white faces with "rabbit sticks" in the form of a black crescent on each cheek. The dancers carried a rattle in the right hand and a bow and arrow in the left. There were fourteen or fifteen of these dancers who formed a single straight row the length of the kiva in the middle of the dance space. The step was like that described for Powamu kachina below, and the dancers faced about at short intervals.

February 5. 13th day. At dawn the children who have been initiated to the kachinas must take a feather and corn meal to the shrine as described above.

In addition to the practice for the Powamu kachina dance, two more kivas made the rounds on the evening of this day: Horn kiva danced Navaho kachina[41] and Chief kiva danced Mountain sheep kachina.[42] The Navaho kachina, upon entering the kiva, passed around to the right of the ladder, stamping the right foot three times, then the left foot, until all were in place, when the leader shook his rattle as a signal to commence the dance. The step was like that described below for the Powamu kachina. There were female impersonations.

In Mountain sheep kachina, each carried a stick, which was used as a cane when entering. The step was executed in double time. While dancing, they moved the hands back and forth across the chest: the right hand with the stick was raised when the left heel was lifted.

February 6. 14th day. The children again went to the shrines at dawn.

Only one kachina dance was given on this evening. Wikwalvi'[i] kiva gave Aŋa (Long hair) kachina.[43] As these dancers entered the kivas, they

[38] From now on Dr. Steward is eye-witness.

[39] Compare Fewkes, pl. 5.

[40] This is the "Hunt" kachina. Compare Fewkes, pl. 49.

[41] Compare Fewkes, pls. 27, 36; A Pueblo Indian Journal, fig. 34.

[42] Compare Fewkes, pl. 40.

[43] Compare Fewkes, pl. 32; A Pueblo Indian Journal, fig. 26.

passed around to the right of the ladder and as soon as each had stepped down to the dance space, he stamped his right foot three times, then his left one as he moved on to take his position preparatory to dancing. The male impersonations were followed by six female impersonations, carrying a spruce twig in each hand. All danced in a single straight row the length of the kiva and without drum.

February 7. 15th day. The children make their third offering to the shrines at dawn.

Wikwalvi'i kiva again performed in the evening, dancing Chaqwâina kachina. This dance was similar to that described for Navaho kachina. Each dancer carried a rattle in his right hand and a bow and arrows in his left with which he motioned while dancing.[44]

February 8. 16th day. At dawn the children who have been initiated to the kachinas make their fourth and last trip to the shrines. They return quickly to their houses and soon after the sun has risen, the kachinas who are to distribute presents may be seen running or hobbling about the mesa. Among these kachinas were Huhuwa,[45] who runs cross-legged, Kwívi,[46] the "sport," so named because he wears a great deal of silver, Héhe'e,[47] who carries a rope which he whirls as he goes, Hu, Bear, and Paŋwup, Mountain sheep.

The presents carried by the kachinas to the children are kachina dolls, highly colored rattles with turkey feathers, moccasins, and bundles of bean sprouts. The beans growing in the kivas have been cut at dawn and done up into little bundles, one of which is given at each household with the presents. The beans have reached a good height and are regarded as a favorable omen of the coming crops. After being presented at the houses, they are cooked up and served for breakfast. I was served[48] with a savory mess of these sprouts cooked with an ear of white corn.

The kachinas continued to run or hobble up and down the mesa, their bells jingling or turtle shell rattles clicking until about breakfast time. About this time three men, naked but for breech clouts, appeared running wildly about the mesa, emitting loud whoops. These were three of the beggars, Soyukö, who were later to make the rounds of the mesa. They stopped for a moment at a puddle between Walpi and Sichumovi to break the ice and bathe and then ran tumultuously away.

[44] At midnight the beans are cut. Watching them in vaticination has ceased this afternoon. (A Pueblo Indian Journal, 51.)

[45] Compare Fewkes, pl. 21.

[46] Compare A Pueblo Indian Journal, fig. 35.

[47] Compare Fewkes, pl. 11; A Pueblo Indian Journal, fig. 20.

[48] I arrived on the Mesa late February 6; but I was not admitted to the kivas until February 8, and then only to the public performances.

All was quiet now until about ten o'clock in the morning, when the Soyukö appeared. These were Haha'i'i wuqti and Nata''aska, accompanied by several other kachinas returning to the houses of the children "for the rabbits" which on the ninth day they had ordered the children to catch for them. The eleven Soyukö filed through the villages in the following order:

Hahái'i wuqti, the "mother of the kachinas." (Fewkes, pl. 12.)
Nata'aska, the "father of the kachinas." (Fewkes, pl. 12.)
Nata'aska mána, the "sister of the kachinas." (Fewkes, pl. 12.)
2 Héhe'e.
3 Nata'aska kúmbi (black Nata'aska).
2 Nata'aska kócha (white Nata'aska).
Nata'aska pála (red Nata'aska).

There were three groups of Soyukö, all the same and one from each village, but all in each group from the same kiva. The privilege of taking these parts rotates among the kivas in each village. This year Walpi was represented by Goat kiva; Sichumovi, by Butterfly kiva; and Tewa, by Pendete.

As the Soyukö went through the villages, they muttered and talked in falsetto voices. From house to house they went, and at each door Hahai'i woman addressed the child: "We have come for the rabbit which we told you to kill for us." It was said to have been customary for the children to bring forth a mouse on the end of a stick and say, "You did not come back when you said you would, so this is all we have left." Although I observed the Soyukö at many houses, I did not see any mice offered them. Hahái'i woman said: "We have come for you. You have been bad. You do not mind your parents. You are mean to other children and are always fighting." The child having cowered behind his mother or hidden in a corner at the first approach of the Soyukö now cringed away and cried with terror. The mother attempted to buy off the Soyukö with gifts. First a plaque of corn meal was offered, which the Soyukö accepted and turned over to the Héhe'e, who put it in a large sack carried for the purpose. Not satisfied with this, they continued to talk and threaten, and the two Héhe'e went into the house with their ropes after the child, often slipping the rope over his foot or around his waist and pretending to tug at it. The child screamed in terror and Hahái'i woman continued to mutter and threaten, and Nata'aska angrily to stamp his staff on the ground. Meanwhile the black Nata'aska, who stood in the background marched forward and backward, always muttering and dragging their saws on the ground. About this time the mother presented the Soyukö some waferbread, but, still unsatisfied, they continued their menacing attitude. Pieces of mutton, which were

turned over to Nata'aska maid to carry in the tin wash boiler which she held on her back generally appeased them and they departed, still mumbling and muttering, to the next house to repeat the performance. Frequently the Héhe'e lagged behind, stumbling with their sacks, tripping on their own ropes, or performing some clownish stunt.

After the houses of the villages had thus been accosted, the Soyukö carried their assault to the kivas. In Sichumovi they went first to Stove kiva. While the black Nata'aska remained on the ground, the others climbed to the roof and demanded food of the inmates of the kiva. These seemed defiant, and a long conversation followed, to the great amusement of the large crowd of villagers (mostly women) which had gathered to witness the proceedings. Only bit by bit did the kiva satisfy the requests of the Soyukö. Meanwhile the Héhe'e capered on the roof and tried to lasso every kiva occupant who dared thrust his head through the hatch.

Finally satisfied at Stove kiva, they went to Butterfly kiva—their own —which immediately adjoins the former. There they were told to wait and that some girls would be ready for them. They went away to a house in Sichumovi and soon returned to Butterfly kiva.

When the Soyukö returned, instead of girls, several young men were sent out of the kiva to greet them. This caused considerable mirth among the spectators. Then five young boys—ranging in age from approximately ten or twelve to sixteen—came out, with blackened faces and clad in dresses and girls' hats. A roar of laughter greeted this.

Everybody now went to the court in Sichumovi and here the five "girls" played basket ball[49] with the three Héhe'e. The referee wore a long beard and had a whistle hung around his neck. The game was spirited and boisterous and no attention whatever was paid either to the rules of the game or to the referee. The Héhe'e were full of buffoonery, and soon the game degenerated into a rough-and-tumble.

After the basket ball game the Soyukö returned to the kiva, followed by the crowd. Here the kiva members lined up and sang, accompanied by a drum, while the Héhe'e danced, "American" fashion, with the "negro girls," hopping about with a nondescript step. One "girl" took Nata'aska to dance, while one of the Héhe'e singled out a fat old woman from the crowd. The last two capered with great verve, but the woman was soon left panting and exhausted. She was rewarded with a leg of mutton from

[49] The American game, with baskets rigged up high at each end of the court. In 1893 the game played was süñwúwĭñpa, in which the ball is attached to a looped string, the player lying on his back, with the loop over his great toe, and slinging ball and loop high over his head. Played by kiva chief and two others against the Heheya. (Hopi Journal.)

the Soyukö collection of spoils. During the dance a Héhe'e tried to run away with one of the "girls"—the Héhe'e are believed to be very fond of girls—but was brought back by the headman of the kiva.

The dance was over about 5 P.M. and the dancers and the Soyukö retired to the kiva and the crowd dispersed.[50]

After the Soyukö retired, all was quiet. The women cooked supper and the men prepared for the Powamu dance or "bean dance," which was to be held later in the evening.

About 9:30 I went into Kisuŋ kiva in Tewa, where I found a dozen or more men, some sleeping or smoking, some practicing their songs or preparing their regalia. As the dancing was not to start until two or three o'clock in the morning, I lounged and watched preparations. As I waited, Satéle (Tewa Town chief) came in and addressed me as "grandson." I observed that at the south end of the kiva there were about fifteen boxes, pots, cans, etc., in which corn sprouts about one foot high were growing. These were to be cut the following morning, but in order to conceal them, as well as various kachina masks hanging on the wall at that end of the kiva, from the eyes of the uninitiated, a curtain was hung across the kiva.

Most of the members of each kiva participate in the Powamu kachina or "bean dance." Thus each kiva has usually twenty to thirty dancers. Each kiva, except Nasava'e kiva in Walpi, which has not sufficient members, sends out a group of dancers. Thus eight groups of dancers make the rounds of the mesa, dancing once in each kiva. A spectator remaining in one kiva therefore witnesses eight separate "acts."

The audience is made up almost entirely of women, who bring their children, even small babies. Men too old to dance, as well as the kiva head, who officiates as host during the dances, also attend. There are in addition usually a number of visitors,—Hopi from the other mesas, even Indians from other tribes. This year there were two Zuñi men and a woman, and a number of white visitors, mostly from the agency or school.

The dancers occupy the larger end of the kiva, while the spectators sit packed and huddled together on the raised portion to which the ladder descends,—usually the north, but in a few kivas the east, end.

Seven of the kivas danced Powamu kachina.[51] Horn kiva danced Flute

[50] When the Soyukö came to the house of my informant, his son who is quite proficient in speaking Navaho, was brought out of the closet where he had been hiding and told to answer them in Navaho: "I can't understand your language and do not know what you are talking about. So go away and don't bother me." This was taken by the Soyukö with a laugh, but they were none the less insistent and gave him rather more than his share of plaguing.

[51] Compare Fewkes, pls. 14, 22.

kachina.[52] During the evening the men prepared their regalia and paint. The first stripped and painted themselves. The right shoulder and left forearm were painted bluish green; the left shoulder and right forearm, tan; and the remainder of the body above the waist, red. On each upper arm were painted two longitudinal stripes, one of bluish green, the other of tan, and two similar stripes were painted longitudinally on each side of the breast. The legs were also painted red with two stripes on each.

On the head were worn three "squash blossoms." These were made of corn husks and had three petals each, each petal painted red and green. Most of these had been prepared during the evening. The collar consisted of longitudinal sections of straw separated by pieces of black "leather (?)." A red bandoleer crossed from the right shoulder to the left hip. The common white cotton kilt was worn, and an embroidered sash hung over it from the right hip. Moccasins completed the dress. In addition to this, all available jewelry was utilized. Each man wore all the necklaces he could procure—turquoise and coral were most esteemed—and many bracelets. A rattle was carried in the right hand; the left hand was free.

Approximately half of each group of dancers were dressed in this way. The other half represented Powamu kachina maids, sisters of the Powamu kachina. Many of these were dressed in regulation woman's garb—dark dress, woman's girdle, blanket, moccasins, and wrapped leggings—and had their hair whorled. Some wore short skirts, hats, and high-heeled shoes, one even carrying a purse. Others merely slung blankets over their shoulders and did not even remove their riding-boots. Sombreros and cartridge belts with six-shooters hung about their waists outside the blankets completed the incongruity of several "maids." Each "maid" wore on his forehead a circular sunflower about four inches in diameter made of pleated paper and held a spruce twig in front of his face with his left hand.

Most of the groups of dancers had, among the Powamu kachina maids, one or two "women" with Hehe'e-like masks with long chins. These "women" were always raggedly attired in a miscellany of old clothes, and carried canes.

At about midnight a man entered Kisuŋ kiva to announce that the kachina were ready and were coming. He returned at about one o'clock to make the same announcement, and again an hour later. Shortly before 3 A.M. the dancers, now in full regalia, performed their dance and left the kiva. The spectators crowded in.

Soon shouts and talking in falsetto voices could be heard from the roof, and the kiva chief who acted as host, as well as one or two other men with

[52] Compare Fewkes, pl. 39.

him, set up a shout of "Yuŋya ai, yuŋya ai!" ("Come in, come in!") The Powamu male kachina entered first, followed by the female. Last of all came the females wearing the Hehe'e-like masks. They furnished the main comic element, stumbling down the ladder and joking with the spectators. A young man who had been standing near the ladder and gazing up at these "girls" as they descended received a severe tap on the head by one of them with "her" cane by way of chastisement.

As the dancers entered, they passed around to the right or west of the ladder, where a young girl tossed a pinch of corn meal after each one from a plaque she held in her lap. As the stove had been removed, the whole south end of the kiva was available for dancing. The dancers passed around the end of the kiva and along the eastern wall. When the dancers had taken their position, the chief of the kiva stepped up to the leader of the dancers and conversed for a few moments in a low tone. He then received an ear of black corn from him and retired to his seat near the ladder.

At a signal from the leader, the men commenced to shake their rattles, slowly at first, then increasing in speed until a lively cadence was reached and the dance began, accompanied by singing. The men sang naturally, the "women" in falsetto.

All but two of the groups were without drums (each of these two had an extra man, who was always last to enter and to leave the kiva, to carry and beat the drum). The dance consisted of short, light steps, the right foot being raised slightly higher than the left and stamped on the ground with each shake of the rattle.

At the south end of the kiva, a Powamu kachina male and "maid" joined hands and danced slowly toward the ladder. With the same step they danced backward to the south end again and then forward, when a second couple joined hands and followed them. When the first couple reached the ladder again, they held their joined hands aloft and separated, each taking his place at the end of his line. In this manner, the two files of dancers slowly moved toward the south end of the kiva.

Each kiva group danced in this way, and although each had a different song, most of the endings were substantially the same: he he he he ha ha ha.

The Hehe'e-like female masks furnished the comic element throughout. The dances each lasted about fifteen minutes, during which a falsetto muttering could be heard on the roof.

When the dance was over, the dancers filed out around the eastern side of the kiva, in the same order in which they had entered. In a few minutes talking on the roof announced the arrival of the next group of dancers, and they were invited to enter.

The body paint of the Flute kachina[53] from Horn kiva was the same as that of the Powamu kachina. The dress differed only in the lack of the red bandoleer and the addition of a rectangular plaque bordered with white zigzags and trimmed with red horsehair, which was worn on the back. In the center of this plaque were two perpendicular stripes, one red and one green, on each side of which were rows of dots. The decorations on two of the plaques differed from the others in that one had simply a rain symbol, while the other had a crescent moon, above which was a five-pointed s'ar. These dancers wore no masks but had tied in their hair many short, cup-like flowers—"buttercups"—and short, fluffy turkey feathers.

The dance step of Flute kachina was the same as that of Powamu kachina except that it was executed in double time. The mass movements of the dancers were the same as those of Powamu kachina except that the couples coming together did not join hands but both faced east and danced sideways to the north end of the kiva, then faced about to the west and danced back, and finally faced east and danced to the ladder again, when they separated and the next couple started out.

The dancing ended at about 6 A.M., and the audience left the kivas.

February 9. 17th day. The men now returned to their kivas after having had breakfast at home. Some, however, had remained in the kivas where they were brought food by the women. This food was "in payment" for the gifts given to the children on the preceding day.

Early in the morning the corn which had been growing in the kivas was cut and prepared for use in the ceremonies on this day. The men who were to impersonate kachinas got ready.

Two men from Chief kiva who were to impersonate Hé'e'e[54] and Éototo kachinas[55] now carried their regalia to Kuwáwaimovek'e, where they dressed. Hé'e'e wore a woman's dress. Only one side of his hair was whorled, for "when they were fixing it up a war started and he got excited so that they could not finish." Éototo was dressed entirely in white.

[53] Said to be a Laguna representation.

[54] Hé'e'e has been impersonated by Le'eteo since he was a boy. Any man from Chief kiva may impersonate Éototo. This year the part was taken by Jean La'pa. Le'etéo is La'pa's uncle, Rabbit clan. Compare Fewkes, pl. 11; A Pueblo Indian Journal, fig. 31.

[55] Éototo is a kachina of the Kokop clan and his mask is kept at the house of the chief of the Kokop clan, Mauhu—"Éototo stays at Mauhu's house." La'pa is the ceremonial father of Mauhu.—J. H. Steward.

As such he was no doubt appointed to Mauhu to impersonate Eototo. In 1892 and 1893 Kokop clansmen impersonated Éototo. The guardianship of Éototo entitles the Kokop clan chief or Éototo chief as he may be referred to, to place among the high chiefs. (Hopi Journal.) —E. C. Parsons.

Compare Fewkes, pl. 14; A Pueblo Indian Journal, fig. 40.

Hé'e'e now started up the trail to the mesa, singing as he went. His song was finished when he neared the top, and he returned to Kuwáwaimuvek'ᵉ. Éototo now started up the trail, also singing, and when he approached the top his song was finished and he returned. Hé'e'e now started out again, singing as before, but got all the way to the top of the mesa before he turned back. When he arrived at Kuwáwaimuvek'ᵉ, Éototo set forth again and went the same distance.

Lá'pa and Le'eteo were accompanied to Kuwáwaimuvek'ᵉ by Kála, Kachina chief, and Daláuwine (his brother substitute), Aŋa, and Máuhu (chief of the Kokop clan). While Éototo and He'e'e ascended and descended the trail to the mesa, these men remained at Kuwáwaimuvek'ᵉ and smoked as prayers for rain.

Thus Éototo and Hé'e'e alternated all day, going a little further each trip. The third time they reached the shrine at the top of the trail. The fourth trip they approached the edge of Walpi. The fifth trip they went to the top of the southernmost kivas in Walpi. On the sixth trip they reached the dance plaza. On the seventh trip they went to Chief kiva.

Meanwhile Kachina impersonators from every kiva had been going through the villages, all day. Among them were: Mountain sheep (who whipped people on the back with a yucca lash); Óhoho[56] (so-called from his cry); Cháhavio;[57] Lapúqtⁱ [58] (who "talks back"); Kö'kö (Prairie dog owl, who goes about all day saying "kuku, kuku"); Dachoktᵘ ("Ball-headed"); Kówiyemci[59] ("Mud head"); Telávai[60] ("Morning"); Ówa[61] (who says "owa, owa"); Má'lo[62] ("Canes"); Chósbushiyaka[63] (with a turquoise nose pendant); Kókopülü[64] (who "bends over"); two Wó'ᵊ[65] (one with a drum, the other with a rattle, who went about dancing); Pü'ükoŋ[66] (war god kachina); Wúpamu;[67] Hülülu;[68] Otótna; Flute; Kwásu kale taka;[69] Bükónya

[56] Compare A Pueblo Indian Journal, fig. 36.
[57] Compare Fewkes, pl. 13; A Pueblo Indian Journal, fig. 27.
[58] Compare Fewkes, pl. 25.
[59] Compare Fewkes, pls. 16, 45; A Pueblo Indian Journal, fig. 28. Generally identified with Dachoktᵘ.
[60] Compare Fewkes, pl. 20.
[61] Compare Fewkes, pl. 20.
[62] Compare Fewkes, pl. 21.
[63] Compare Fewkes, pl. 24.
[64] Compare Fewkes, pl. 25.
[65] Compare Fewkes, pl. 6.
[66] Compare Fewkes, pl. 29.
[67] Compare Fewkes, pl. 31.
[68] Compare Fewkes, pl. 6.
[69] Compare Fewkes, pl. 47.

(who carried and swung a bull roarer). There was one other kachina who carried a gourd, from which he poured water on people's heads. These kachinas are said to be all "brothers." From time to time they returned to their kivas to report Hé'e'e's whereabouts and were said to be "looking for Hé'e'e kachina." Eight Horn society members dressed in white and wearing large ram horns, marched up and down the mesa in single file.

Éototo made but seven trips to the mesa. Hé'e'e on his eighth trip went all the way to the southern end of the mesa beyond Walpi. From here he climbed to the highest point on the whole mesa, Wopákochovi, and then proceeded to Síswupakichovi, the house-top from which announcements are made. Here he whirled his quiver, east, south, west, and north, and then all the way around, crying, "Ooooooo." After this he returned to Kuwáwaimuvek'ᵉ. All day neither Éototo nor Hé'e'e had eaten. At this time the six men at Kuwáwaimuvek'ᵉ were permitted to eat, partaking of salt and meat, which none of them had been allowed for four days.

Hé'e'e made his last trip about five o'clock in the afternoon. Meanwhile Dü'mas kachina and her two sons, Duŋwup kachina, had dressed in Chief kiva and at He'e'e's seventh trip, had gone below the mesa on the western side to get Gwitok kachina, who had dressed there. Gwitok kachina[70] is said to live below the mesa on this side. Gwitok kachina wears a blanket of wild-cat skin and a mask with hair hanging down behind. One or two men accompanied him below the mesa to aid him in dressing.

When Hé'e'e mounted to Síswupakichovi, all the people had to go inside their houses and stay there, for at this time the corn was carried from the kivas to Kuwáwaimuvek'ᵉ. Hé'e'e returned to Kuwáwaimuvek'ᵉ and Dü'mas, the Duŋwup and Gwitok kachinas commenced to ascend to the mesa from the west. Dü'mas preceded and was followed by her two sons, and finally Gwitok kachina. As Dü'mas walked, she called in a falsetto voice to her sons, telling them to "keep up," and the boys replied that they were coming. On top of the mesa they walked around through Walpi and then descended to Kuwáwaimuvek'ᵉ, where the boys and girls who were to participate in the following ceremony had assembled.

During this time the people in the villages had remained indoors, their doors locked and windows covered, not daring to look out. This was to prevent their seeing the corn as it was carried down to Kuwáwaimuvek'ᵉ. Those who were dilatory in going inside were whipped and driven in by kachinas. From time to time kachinas pounded and beat the doors and windows, causing laughter among the women but great terror among the young, uninitiated children.

[70] Gwitok was impersonated by Sána, of Chief kiva and the Kokop clan. Sána is Mauhu's uncle.

The corn sprouts from the kivas had been carried down to Kuwáwaimuvek'ᵉ in large bundles by the kiva members. Finally when Dü'mas, the two Duŋwup, and Gwitok kachinas arrived, it was made up into large stacks or iᵉpi. Four sticks, three or four feet long, were laid crosswise and a core of grass tied up with yucca was placed in the center of these. Around the base of this core of grass were laid ears of corn of all colors. The corn sprouts were then tied up into small bundles affixed to the ends of short sticks, üyi (plants), which were thrust into the yucca so as to cover it completely, the green corn standing out from all sides. These stacks of corn were approximately three feet high and of equal diameter. As each kiva had one iᵉpi, there were in all, nine iᵉpi. Harry Supela had made nine ⁱⁱyi, one of which he put in each iᵉpi. The iᵉpi were now placed in a row, north and south. By each iᵉpi was placed a bundle of four ears of corn, brought by the girls (see below).

The chiefs and kachinas now lined up in the following order: Daláuwine, Harry Supela, Hé'e'e, Éototo, Dü'mas, and two Duŋwup and Gwitok kachinas. This procession now walked four times around the row of iᵉpi, each man touching each iᵉpi once as he went around.

After this preliminary they were ready to ascend to the mesa. Those just named proceeded in the above order and were followed by the bearers of the iᵉpi. These were the boys who had been through the Wöwöchim ceremony the preceding fall and now impersonated any kachina they desired. They had impersonated their chosen kachina all day on the mesa. If there is more than one Wöwöchim novice for any kiva, they all assist in carrying the iᵉpi. If there are not enough novices, one from a former Wöwöchim initiation serves. Each boy was accompanied by a girl[71] who was dressed as the maid of that kachina. This year there were ten boys and nine girls. For practical purposes, the iᵉpi, which were quite heavy, were carried to the top of the trail by any unmasked men of sufficient strength. At the top of the trail, however, they must be taken over by the Wöwöchim novices in kachina dress and their kachina maids.

As the procession advanced, Harry Supela sprinkled corn meal from a sack and the kachinas and kachina maids followed singing and dancing.

When they arrived at the top of the trail, Harry Supela made nine cloud symbols, omauveta, with corn meal, at the top of the trail, on which the iᵉpi were to be set. These were made for the different kivas in the following order, north to south: Pendete, Kisuŋ, Stove, Butterfly, Goat, Horn, Nasava'ᵉ, Wikwalvi'ⁱ, Chief. The clouds were represented with the rain falling toward the north. The boys and girls were lined up in the same

[71] These girls must be Hopi. They may be of any age. They are invited to take these parts by Daláuwine, Supela, or any of the Hopi chiefs.

order carrying the i'pi, the boy on the left, the girl on the right. The tied corn ears were carried by the extra boy, or if there was but one to each i'pi, it was carried for him by a kachina. These passed along the line of cloud signs, the boys on the left of them, the girls on the right, holding the i'pi directly over them, until the Chief kiva novices came to the last cloud sign. All were now in place and set the i'pi on the cloud signs with the tied corn ears on their north sides. Dü'mas, Duŋwup, and Gwitok kachinas now went around four times (see fig. 1), led by Harry Supela. As the kachinas passed the i'pi, the boys stepped between the i'pi and grasped the top of their own, and Harry Supela sprinkled corn meal on each i'pi while the kachinas touched each one. This was done four times. Meanwhile other kachinas who had been active during the day were on hand to guard the i'pi lest they blow over or some evil befall them.

The i'pi were now taken up again and the procession moved on to a point near Walpi where this performance was repeated. Cloud signs were made, the i'pi set down, and four circuits made by Harry Supela and the kachinas. They then moved on again to the first houses in Walpi, where the same ritual was gone through.

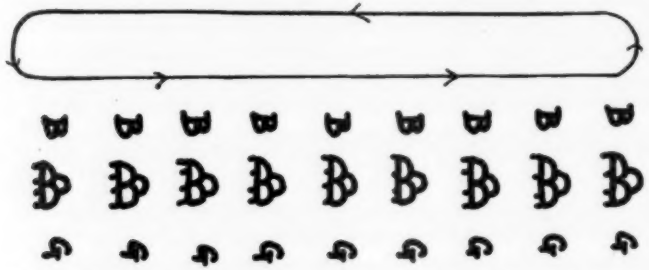

FIG. 1. Cloud signs and circuit by kachinas. Arrow = circuit followed by kachinas in walking four times around to touch the i'pi; B = boy; G = girl.

This was repeated the fourth time in the same manner at Kisonbi, the dance plaza in the center of Walpi.

When the kachinas and Wöwöchim novices started up the trail with the corn, the people who had been confined to their houses were now permitted to come out and witness the ceremony. When the i'pi were set down the fourth time on the cloud signs, Harry Supela requested them to "cover up" the children who had not been initiated to the kachinas, so that they should not see the remainder of the performance.

After the ritual had been gone through for the fourth time, some masked

man picked up the iˀpi belonging to his kiva and held it on his right shoulder. Some other man from that kiva, not in mask, now ran up and took it from him, carrying it as quickly as possible toward the kiva. He ran as rapidly as possible with the heavy load, while men followed to pick up any pieces that might have dropped. Others from his kiva ran with him, relieving one another. The tied corn ears were carried by one of the men. The kivas must carefully guard their iˀpi and tied corn ears, for if any part were dropped it might be appropriated by another kiva. Thus Chief kiva lost its tied corn ears, which fell into the hands of Kisuŋ kiva. This was supposed to have brought the latter good luck in their crops, the former poor luck.

After the iˀpi and tied corn ears were removed and taken to the kivas, the boys and girls remained standing by the cloud signs. Harry Supela then led the kachinas and the boys and girls around the cloud signs four times, sprinkling meal on the clouds each time. After this all returned to Kuwáwaimuvekˀe and removed their regalia. The girls went to their homes, the boys to their kivas.

At their kivas the men dismantled the iˀpi, giving üyi to each man. The ears of corn were taken to the girls who had impersonated the kachina maids. These ears were to be used by the girls for planting the following season. The men took the corn sprouts to their fields, where they were buried for good luck.

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MINUTE BEADS FROM PREHISTORIC PUEBLOS[1]

By EMIL W. HAURY

EXCAVATIONS within the confines of the area formerly occupied by the prehistoric Pueblo Indians have yielded a marvelous variety of beads which were utilized in the embellishment of the human body. Broadly speaking, two types of beads were manufactured. The first group comprises small univalve and bivalve marine shells, which were readily adapted for stringing by merely grinding off the spire of the shell or by making a rough perforation through the shell wall. Beads of the second type normally take the shape of small discs having centrally located perforations. These were carefully worked from naturally occurring substances such as stone, bone, or shell; less frequently they were molded from prepared clay. Among the beads of the second type is a class that has long attracted much attention because of the minute forms and the perfection with which individual specimens were wrought. Although the whole ancient Pueblo art of bead-making is worthy of a close study, it is this latter class of unusually small beads with which we are here primarily concerned.

The interest aroused by these beads is justified, since they excel the beads made by any other primitive tribes of North America. Compared with a heterogeneous collection of beads made by Plains and Coastal Indians, they readily show superior and refined workmanship. Even a comparison of ancient Pueblo beads with those from modern pueblos proves the inferiority of the latter, indicating deterioration. Hence, as objects of their kind, designed solely for ornamental purposes, they undoubtedly have never been equaled in North America.

The diminutive beads in the Arizona State Museum collection, either in necklace form or loose, have been gathered from a large number of ancient pueblo sites ranging from the San Juan drainage in the north to within a few miles of the international boundary on the south. The distribution was evidently general throughout the major part of the area, and the manufacture of small beads was not wholly confined to a small community. However, the countless numbers found in the Salt and Gila River valleys, notably at Casa Grande, apparently distinguish that region as a center of the art, where it played a prominent part among existing industries.

[1] In preparing this paper the extensive bead collections in the Arizona State Museum at the University of Arizona and in the Casa Grande National Monument Museum were placed at the disposal of the writer by Director Byron Cummings and by Mr. Frank Pinkley, Superintendent of Southwestern National Monuments, respectively. To Professor R. J. Leonard of the Department of Geology of the University of Arizona we are deeply indebted for collaboration on the study of materials used by the ancients in the manufacture of beads.

One of the most productive bead areas which has yet come to notice is situated just east of Compound *B* of the Casa Grande group of ruins. This spot is believed to be an ancient cremation ground because of the prevalence of calcined human bones in the soil and the presence of occasional funerary urns. Beads and other ornaments also bearing marks of subjection to fire are abundant. These, without question, were worn by the dead at the time of cremation. This area has undoubtedly yielded the smallest individual beads yet discovered (see p. 83).

The accidental burning of rock, as in cremation, usually alters the condition of the material, a circumstance which complicates analysis. Turquoise, for example, loses its blue color and turns to a grayish black upon heating, while a naturally dark carbonaceous rock may turn lighter. Shell, on the other hand, normally turns gray or black.

According to some, most of the beads in the cremation ground at Casa Grande were of turquoise. The common use of this stone for beads in other Southwestern ruins has been well demonstrated.[2] Tests made on several hundred specimens gathered at random in this area have yielded only a few beads made of turquoise. By these tests less than 5% of the beads were presumably made of the much desired turquoise, whereas a large proportion roughly set at about 60%, were made of other varieties of a natural stone. Beads of shell and clay share approximately equal proportions in the remaining 35%. These estimates, based upon specimens 2 mm. in diameter or less, are reasonably trustworthy in pointing out that beads from natural rock were far more prevalent than those of either shell or clay. In collections of beads larger than 2 mm. in diameter, an increased percentage of shell is usually found.

To be sure, a single bead was but a small part of an ornamental production, ordinarily in the shape of a necklace. When considered singly, surprisingly minute specimens might be isolated from beads with larger average diameters and becoming, therefore, mere oddities; but such is not the case since the examples described below are composed of countless numbers of tiny discs having exceedingly small calibers and correspondingly smaller perforations.

The finest of all small bead necklaces which have yet come to light is pictured in plate 8*a* (Arizona State Museum, cat. no. 1645). The beads were found unstrung in the sand filling of a burial olla coming from a ruin in Kaycuddy wash, near Kayenta, Arizona. The majority are dark gray to black and are fashioned from a natural stone. A relatively small number of red beads were also enclosed in the olla, intermingled with the black ones.

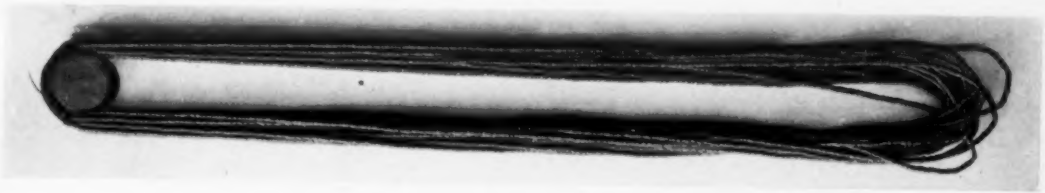
[2] F. W. Hodge, 1921; G. H. Pepper, 1920; N. M. Judd, Sept. 1925.

Whether both types were originally component parts of a single necklace could not be determined, but in their present state they are strung in such a way that the red beads are interspersed among the black at approximate intervals of one inch. When extended in a single string to its maximum length, the necklace is 32 feet long; or, as shown in plate 8*a*, there are 16 strands, each of which is two feet in length. With an average of 40 beads to the inch, the bewildering total of over 15,000 tiny individual discs make up this one article of adornment. Speculating as to the time required for the manufacture of such a quantity of beads, we get even more startling figures. Allowing fifteen minutes per bead for the process of manufacture, which includes the collection and preparation of tractable material, the making of drills, the drilling process, and the final polishing (a bare minimum for the time required), it took a single individual approximately 480 eight-hour days to manufacture these 15,000 or more beads. Such production certainly proves that the Indian was not averse to novelty, and in this case, to a rare individualistic expression in bead-making.

Analysis of the material of the black beads indicates that they were manufactured from a natural dark-colored slate or argillitic rock, not from prepared clay as one might suspect. The exterior surfaces of the beads are highly polished and are considerably darkened from the absorption of body oils derived from the wearer's skin. The red beads are of a natural fine-grained rock of unidentified variety. Although there is some variation in the diameters of the black specimens, the mean is 2 mm., just slightly larger than the average pin head. The red beads average 2.14 mm. in diameter.

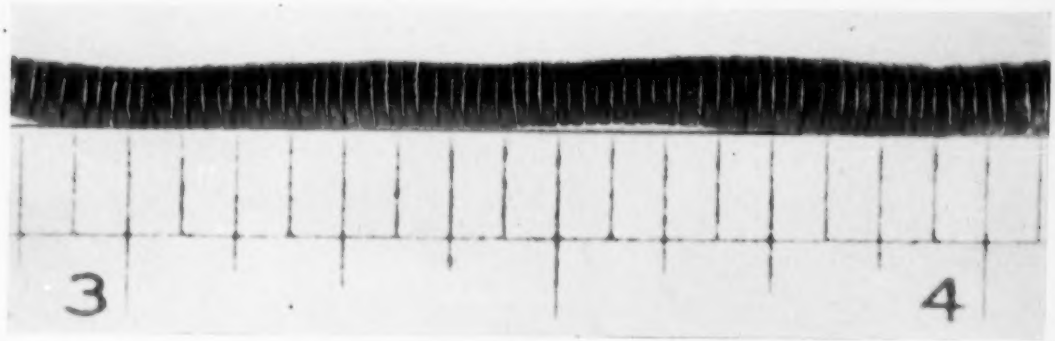
Not long ago a string of beads strikingly analogous to the necklace just described was unearthed with an infant burial at Casa Grande by Mr. Frank Pinkley. The necklace, now in the Casa Grande Museum, is over seven feet long and is made up of black and red beads identical with those of the above-mentioned product. The tiny discs average 45 to the inch, with from eight to ten red ones interspersed in every inch of the black beads. The stylistic similarity of the two necklaces might lead one to consider them products of the same hand.

One of the best illustrations of uniform calibrations and equal diameters in small beads was unearthed in a cliff pueblo in Nitsie cañon, in northern Arizona. Although the necklace is fragmentary and incomplete, there are approximately 42 inches of beads still on the original cotton thread. The beads exhibit equal diameters of 2.14 mm. with but few variations and are strung so as to average 60 to the inch. An inch section, enlarged nearly five and one-half times (pl. 8*b*, Arizona State Museum, cat. no. 457), illus-



a

A prehistoric necklace 32 feet long when fully extended, and composed of over 15,000 stone beads.



b

A string of ancient stone beads averaging 60 to the inch. Enlarged about 5½ times.

Photomicrographs of tiny beads. *a*, shell (calcined); *b*, stone, enlarged about 25 diameters; *c*, clay; *d*, stone, enlarged about 30 diameters.

trates the above points. Unless examined at close range, the fragmentary necklace might be mistaken for a red cord, since the flat faces of the beads are so closely fitted together that the interstices are barely perceptible. The material from which these beads were fashioned is a fine-grained crystalline rock of pelitic character. Upon heating, the color is considerably lightened, due to the volatilization of body oils.

This brief statement defines the type of beads under consideration and the skill attained by the ancient Pueblo Indians in the quantity production of such minute and delicate objects.

A purely dimensional study from different sections of the area reveals that the smallest individual specimens were made at Casa Grande. The surprising feature here is that they were as symmetrically and perfectly formed as beads of larger diameters which could be worked with greater ease. The smallest bead in the collections at hand measures but 1.30 mm. across the flat face of the disc. Others ranging from 1.75 mm. to 2 mm. are not uncommon. The thickness, or distance between the two flat faces, usually does not exceed 1 mm., and a minimum thickness of .25 mm. has been measured. This figure can be more fully appreciated with the understanding that a hundred like beads could be strung on a thread but one inch in length! More surprising than this, however, are the tiny, uniform, and centrally located perforations. Diametrical measurements of the latter vary from .51 mm. to 1 mm. A perforation of the smallest size just given will barely allow the free passage of the finest commercial sewing needle, a no. 10. Hence it usually becomes necessary, when dealing with such tiny objects, to use a bead needle in order to avoid a great breakage of specimens,

From a study of several hundred specimens—many of them examined in cross-section through a binocular microscope of 25x and also submitted to chemical and petrological tests—it appeared that the beads were made either of artificially prepared or natural amorphous materials. Beads of artificial substances were produced from a very fine textured fictile clay and consolidated by a firing process. The beads of the second variety of materials were fashioned directly from naturally occurring stone and shell.

Slate, one of the common natural materials used, and prepared clay consolidated in an Indian's fire, at first seemed to bear the same characteristics. Closer scrutiny, however, showed that the substance in the molded specimens displayed in cross-section a marked porosity and a so-called plastic flow structure, which can be identified by faint lines in the clay resulting from the molding process and emphasized by the unevenness of the coloring matter. In many cases the natural color of the clay was obviously enriched by an admixture of iron oxides. As a rule, the artificially fired clays have

undergone little or no recrystallization, while the reverse condition usually exists in the natural substances.

The native rocks display neither the porous texture nor the plastic flow structure of clay. The coloring matter, whether ferruginous or carbonaceous, is evenly distributed, although in some cases accentuated by the absorption of body oils. The varying hues of red and black beads were derived from compact argillaceous or pelitic rocks, in which crystallization is manifest. Other natural substances are apparently lacking in the smaller beads under discussion.

Shell beads, as a rule, are readily distinguished by their reaction to hydrochloric acid, and by their laminar structure. The latter trait is well illustrated in plate 9*a*, which shows a shell bead from Case Grande enlarged approximately 25 diameters. A third distinguishing trait which may be ordinarily seen in shell beads is their concavo-convex shape or saucer-like form (also see pl. 10*a*).

For the technological aspects of bead-making it was necessary to study the outward appearance of many specimens in order to detect some mark valuable for the determination of the methods and the nature of the instruments employed in manufacture. It must be stated that many details are still to be filled in.

Clay beads were evidently made by at least two methods, which may be briefly characterized as follows: (a) by a process of molding each bead individually around a vegetable fiber; (b) by a process of encasing a grass stem or another suitable fiber with a thin layer of wet clay, thus forming a tube, which was sectioned at more or less regular intervals by shallow incisions. After drying, the tube was subjected to fire. This consolidated the clay and burnt out the vegetable core, preparing it to be broken into sections at the incisions. The rough edges resulting from the severing of the segments were worked down as the final treatment, although in many cases they were never retouched.

The second method is illustrated by many good specimens, which represent all stages of manufacture after the firing process. Some of these are shown in plate 10*a*. Especial note is to be taken of the several fragments of clay tubes, which were not broken at the intended places. The uneven scorings of the cylinders are well indicated. A good conception of the breakage face and the depth of the incision can be gained from the photomicrograph plate 9*c*, a case where the bead was not retouched after detachment from the tube. This specimen also illustrates two other dominant characteristics of clay beads, namely, the sub-circular shape and the off-center aperture.

Beads. *a*, clay; *b*, shell; *c*, *d*, stone. Of the shell beads, all but the first one on the left have been calcined. In *c* the first three specimens show the several stages of manufacture of stone beads.

The technique of manufacturing beads of natural substances was by far more difficult to unravel than the methods of making clay beads. One of the first questions that arises in connection with stone and shell beads concerns the method of drilling the incredibly small apertures. A comparison between the shell and stone specimens in plate 10*b* and *d*, shows that as a rule the larger perforations are found in the beads of shell. Undoubtedly the nature of the shelly substance permitted the perforations to be made with larger drill points without breakage, whereas rock would be more liable to split. Hence a smaller drill was used. In cross-section the perforations of the stone beads reveal several types of drills. The most common perforation is one which is uniform in diameter throughout the thickness of the

FIG. 1. Types of perforations in minute stone beads.

disc, as illustrated in plate 9*b* and figure 1*a*. A hole of this nature was apparently made by means of a long slender instrument on which the bead was rotated after the boring in order to obtain the uniform diameter. A sharp, abruptly tapering instrument was also used, as indicated in plate 9*d*, and figure 1*b*, in which a conical drilling was produced. In some cases the perforations are biconical, i.e., drilled from both sides of the disc with a tapering instrument (fig. 1*c*).

Unfortunately archaeological research has not yet revealed the remains of instruments which can be definitely connected with the manufacturing processes of small beads. It is unreasonable to suppose that a flake of flint was chipped to a point sufficiently small for drilling a hole .75 mm. in diameter and so uniformly cut that even under magnification the irregularities are seldom distinguished. It is known that small reeds and tough grass stems were used with grinding media as drilling devices by primitive peoples, but here again it is doubtful if such a method could produce the exceedingly small apertures under question. A very sharp splinter of bone may have served the purpose, but it can be well imagined that nearly as much time would be required in making a supply of bone drills as would be in the bead-making process itself.

The instruments required must have been sharp, tough, and slender, readily obtainable and plentiful. Precisely such a tool was furnished by nature in the spines of several species of Southwestern cacti. The two species producing the most likely spines which could be adapted for drills

are *Carnegiea gigantea* (sahuaro), and *Echinocactus wislizeni* Engelman (visnaga or barrel cactus). The needles of the former species are usable only from the young specimens, since those from the more mature plants tend to become woody and are consequently of no value. The spines of the *Echinocactus wislizeni* Engelman are arranged in clusters along the vertical ribs of the plant. The central and longest needle of the cluster is normally "fish-hook" in shape, and of the half dozen or more straight and stout lateral spines, the largest ones are best suited for drill points. These range from one to two inches in length, are very sharp and slender, and are composed of an extremely tough material.

The experiment described in the following paragraphs was merely an attempt to prove the serviceability of cactus needles as drills. Since as yet no archaeological data corroborate such use, the experiment has merely suggestive value.

The stony substance here used was a thin plate of fine-grained pelitic rock, light red in color. It was picked up on an ancient ruin site and bore marks of having been worked into its plate-like shape. The texture and the color of the material greatly resembled that of some of the beads in the Museum collection; hence the rock was probably prepared originally for the same purpose to which it was put in this test.

As for the steps in the preparation of the material leading up to the drilling process, the procedure was undoubtedly much like that described by Hough,[3] who speaks of selected stones made into flat plates and rounded off by holding the small bits between the fingers and rubbing them over an abrasive surface. This was followed by the drilling of the aperture and by stringing together a number of discs, drawing them over sandstone or through a groove between two fine-textured stones to round them off, and finally polishing by rubbing them over leather.

With a few modifications this procedure was followed in the experiment. A fragment of the rock already described was reduced to a plate 1.47 mm. in thickness by rubbing it over an abrasive surface. A sharp piece of flint served in cutting this plate into segments approximately 4 mm. square, which were detached from the plate by breaking. In the center of one of the blanks, an aperture was started with a flint point in order to provide a footing for the drill. The drill itself was made by setting a spine of *Echinocactus wislizeni* Engelman into a notch in the end of a small stick and was held in place with a binding of cord. The drill was set into motion by rotation between the palms of the hands and was aided in the grinding process by recurrent additions of fine sand and water. Approximately fifteen minutes were required to pierce the fragment of stone. It was then rolled about

[3] Walter Hough, USNM-B, 87: 26, 1924.

on the needle until the diameter of the perforation was uniform throughout its length. The pierced blank was next worked roughly into a round form by holding it between the fingers and passing it over an abrasive surface. In the absence of a larger number of beads in the rough with which it might be strung and re-worked the blank was revolved obliquely over sandstone, the drill serving as an axis. For the finishing touches the faces of the disc were reground, which eliminated all traces of the pit made with the flint point and at the same time considerably diminished the thickness of the bead.

The finished product measured 3.39 mm. in diameter, 1.13 mm. in thickness, and had a perforation .94 mm. in diameter. When subjected to examination with a number of genuine beads it could not be detected.

Original examples of partly and completely drilled stone blanks, and an unfinished steatite bead may be seen in plate 10*c*. Plate 10*d* includes a representative selection of small-type stone beads.

Obviously the smallest beads of which measurements have been recorded here could not have been held between the fingers and in that way drilled and worked to their symmetrical shape. It is likely that the blanks which were marked off on the thin plates of stone were drilled, then detached, and strung for the final finishing process.

Since the majority of small beads are made of a natural fine-textured workable rock, it would appear that their distribution was greatly dependent upon the occurrence of such materials. Quite evidently the desired materials were imported into regions where suitable elements did not exist, but unfortunately no traces have yet been discovered of aboriginal quarries which might point towards the original center from which the art of making beads disseminated.

In conclusion it may be said that the ancient Pueblo bead-maker's art is unique in several respects. It bears no analogous development in the archaeological areas to the north, east, south, or west. It was carried to a perfection difficult to grasp when we consider the primitive tools employed in the various stages of manufacture. It has experienced a general deterioration from prehistoric to modern times, since the work of the Pueblo Indians of today does not approach the work of their forebears. Finally, it is evident that the art of making beads underwent an independent and uncommon development, to which these and many other products bear ample testimony.

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TYPES OF "TRONATTAS" OR STONE IMPLEMENTS USED BY THE ABORIGINES OF TASMANIA[1]

By WILFRID D. HAMBLY

ETHNOLOGISTS have not ceased to lament the passing of the Stone Age Tasmanians without adequate study. Practically nothing is known of the social factors, which seem to have escaped observation. This is not surprising when one takes into consideration the difficulties of ethnological inquiry in relation to religious beliefs, magic, social organization, and law. The classical summary of Ling-Roth[2] makes clear the paucity of evidence respecting what is sometimes called the non-material aspect of culture. The origin of the Tasmanians themselves remains a matter of conjecture, though a consensus of opinion allies them with Melanesians and Negritos of the Andamanese type. Since the time of Ling-Roth's summary of the osteological evidence, papers relating to the physical appearance and physical anthropology of the Tasmanians have been published by Berry,[3] Basedow,[4] Malcolm,[5] and Duckworth.[6] Possible methods of arrival of the Tasmanians in their island home have been discussed by Kenyon and others, whose joint paper (Rept. Aust. Assoc. for Advancement of Science, 17: 467–9, 1924) suggests that the aborigines had been settled in Tasmania about 7000 years when European intruders arrived. A large body of facts and theories have been sifted by J. W. Gregory,[7] who comes to the conclusion that the Tasmanians travelled down the eastern side of Australia which abutted far into the Tasman sea in recent geological times. Gregory's summary is profitably read in conjunction with an article by N. W. Thomas on the navigation and canoes of the Australians and Tasmanians.

In dealing with the material culture of the Tasmanians, the investigator may be certain that they used wood, stone, and skins. Some doubt exists

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[1] A description of the collection in Field Museum of Natural History, Chicago.

[2] H. Ling-Roth, Aborigines of Tasmania, 1899.

[3] R. J. A. Berry, The Craniology of the Tasmanian Aboriginal, JRAI, 44: 122, 1914.

[4] H. Basedow, Relic of the Lost Tasmanian Race. Obituary Notice of Mary Seymour, Man, no. 81, 1914.

[5] L. W. G. Malcolm, Short Notes on the Inhabitants of Cape Barren Island, Bass Str it, Tasmania, Man, no. 71, 1920.

[6] W. L. H. Duckworth, Craniological Notes on the Aborigines of Tasmania, JRAI, 32: 177–180, 1902.

[7] See "Australasia," *in* Stanford's Compendium of Geography and Travel, ch. 8 (London), 1907.

with regard to the employment of bone. Noetling[8] states that after a careful study of camping grounds there is justification for rejecting the view that the Tasmanian aborigines manufactured implements from bone. He doubts the authenticity of a bone scoop in the Hobart Museum and says that he never found a single piece of bone that could, even with the greatest stretch of imagination, be considered an implement. The artifacts of the Tasmanians were reduced to a minimum, and the response to favorable environmental conditions was surprisingly meager. Such cultural lag is perhaps to be ascribed to an absence of contacts. There was no infusion of ideas from outside either through warfare or peaceful infiltration.

So far as is known, the stone implements were used for skinning, scraping, gouging grooves on the grips of clubs, cutting notches in trees to aid climbing by insertion of the toes, and trimming the points of plain wooden spears. Plates 11–16 show Field Museum collections from Tasmania and Victoria; these serve further to illustrate the types of primitive stone implements used in those regions. (See also table 1.) The types should be studied in conjunction with those given by Sir E. B. Tylor,[9] 1898–9, also by Noetling.[10] Such terms as "hand-axe," "side scraper," "double sided scraper," "ovate," "round-nosed," and "thumb-stone" scraper, likewise the terms "gouge" and "flaked-knife" are convenient distinctions. They are permissible as long as such names are not meant to denote a rigid demarcation which does not exist.

Plate 11*a–c* shows the roughly chipped stones called "handaxes." There is a record of Rollings having seen such a stone hafted by a Tasmanian in 1840, but this hafting and binding with sinew was a rare method due to the influence of aborigines introduced from New South Wales in the early days of Tasmanian settlement by Europeans. *d* is a quartzite implement having a useful projection or "duck-bill" in the top righthand corner. *e* and *f* are "thumb-stone" scrapers, and *g* is a flaked knife. Plate 12 shows the flat reverse sides of these implements. There may be an objection to

[8] F. Noetling, Study of the So-called "Bone Implements" of the Aborigines of Tasmania, Paps. and Proc. Royal Soc., Tasmania, p. 102, 1911–12.

[8a] Photographs reproduced in this paper by courtesy of Field Museum of Natural History. Identification of rocks made by Mr. Sharat K. Roy, Assistant Curator, Department of Geology, Field Museum of Natural History.

[9] E. B. Tylor, On the Occurrence of Ground Stone Implements of Australian Type in Tasmania, J[R]AI, 24: 335, 1894; *ibid.*, On the Survival of Palaeolithic Conditions in Tasmania and Australia, J[R]AI, n.s., 1: 199, 1898–9; *ibid.*, General Account of Lives of Aborigines of Tasmania, J[R]AI, 23: 52, 141–152, 1893.

[10] F. Noetling, Red Ochre and Its Use by the Aborigines of Tasmania, Paps. and Proc. Roy. Soc., Tasmania, p. 30, 1909.

the use of a terminology borrowed from European archaeology, but the word "Mousterian" is conveniently descriptive.

Plate 13*a*, *b* pictures two side-scrapers, the former of quartzite, the latter of chert. *c* and *d* are round-nosed scrapers, the former of conglomerate, the latter of cherty sandstone. *e–h* are "stone knives" from Victoria, Australia. There is a general resemblance between the Tasmanian and Victorian methods of chipping, but the relative coarseness of the Tasmanian forms is not so apparent in examples described by G. Horn.[11] Plate 14 shows the reverse sides of these scrapers.

In plate 15, *a* and *b* are gouges. *c* is a double-sided scraper of hard sandstone, and *d* is a similar implement of quartzite. Both *c* and *d* are of a typical plano-convex form. Implement *e*, of gray quartzite, and *f*, of very compact sandstone, are rightly described as ovate scrapers, as also are *g* and *h*. Plate 16 shows the unworked reverse sides of these scrapers.

In addition to these stone implements several stone artifacts are said to have been used by the Tasmanians. Noetling[12] has photographed chipped stones, which he claims to be an intentional reproduction of the forms of the wombat, the snake, a human face, and a bird's head. These should be compared with palaeolithic figures of flint from old alluvia of France and England, described by W. M. Newton.[13] R. W. Legge[14] has pictured "pounders" or "hammer stones," found along the east coast of Tasmania, on the shores of the estuary of the Derwent, and in wind-blown sand pits of the midland regions of the island. From the north shore of the west coast Legge gathered pounders of elongated shape which were in kitchen middens. He suggests that these were used for opening shells of the green whelk. Early explorers of the Tasmanian coast were at times greeted by showers of stone missiles of a kind found recently in a cache. H. S. Dove[15] reports that there are in northwest Tasmania two distinct types of hammer or pounding stones. These are regarded by Noetling as "sacred" or "magical" emblems. Dove describes one such stone which had been used for pounding red ochre, but Noetling states that red ochre was removed from the matrix by scraping and not by pounding.

As one handles these roughly chipped implements the imagination goes

[11] Cf. stone implements of the Tasmanian aborigines and those of Victoria (see pls. 26 and 27, Paps. and Proc. Royal Soc., Tasmania, p. 183, 1921).

[12] See fn. 8.

[13] W. M. Newton, On Palaeolithic Figures of Flint, Journ. Brit. Arch. Assoc. March, 1913.

[14] R. W. Legge, Pounders or Hammer Stones of the Aborigines of Tasmania, Paps. and Proc. Roy. Soc., Tasmania, p. 25, 1927.

[15] H. S. Dove, Pounding Stones and the Use of Red Ochre by the Aborigines of Tasmania, Paps. and Proc. Roy. Soc., Tasmania, p. 262, 1910.

a–c, roughly chipped stones called "hand axes"; *d*, a quartzite implement with a projection or "duck-bill"; *e*, *f*, "thumb-stone" scrapers; *g*, flaked knife.

The flat reverse sides of implements in plate 11.

a, b, quartzite and chert side-scrapers, respectively; *c*, conglomerate round-nosed scraper; *d*, cherty sandstone round-nosed scraper; *e–h*, "stone knives" from Victoria, Australia.

The reverse sides of scrapers shown in plate 13.

a, *b*, gouges; *c*, doublesided scraper of hard sandstone; *d*, similar implement of quartzite; *e*, gray quartzite ovate scrapers; *f*, compact sandstone ovate scrapers; *g*, *h*, ovate scrapers.

The reverse sides of the scrapers shown in plate 15.

TABLE 1. STONE IMPLEMENTS FROM TASMANIA AND VICTORIA

Specimen as illus. on plates[16]	*Locality where found*	*L×B (max. cm.)*
11*a*	Lemana	13×5
11*b*	Old Beach	10×8
11*c*	Tasmania (locality ?)	10×8
11*d*	Old Beach	6×3.5
11*e*	Kelso	4.5×3.5
11*f*	Lenah valley	5.5×4.5
11*g*	Mount Leslie	6.5×3.5
13*a*	Old Beach	6.5×4.5
13*b*	Beam's Ford	6×4
13*c*	Port Sorell	6×4.5
13*d*	Barnard's creek	4.5×4
13*e*	Victoria, Australia	5×3
13*f*	St. Kilda, Victoria, Australia	3.5×3
13*g*	Victoria, Australia	5×4
13*h*	Southwest Victoria, Australia	4×4
15*a*	Smithton	4.5×3.5
15*b*	Risdon	5×3
15*c*	Barnard's creek	7×4.5
15*d*	East Tamar	8×4.5
15*e*	Glenorchy	5.5×5
15*f*	Risdon	6.5×4.5
15*g*	Tasmania (locality ?)	5.5×5
15*h*	Tasmania (locality ?)	6×5.5

back to such incidents as that described by Raynor in the year 1818. While noisily chattering, the blacks were breaking stones into fragments either by dashing them on the rocks or by striking them with other stones. They then picked up the sharp-edged pieces for use. One old fellow, with energy surprising for his years, dashed one stone upon another, meanwhile leaping high into the air to avoid the flying splinters.

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[16] Plates 12, 14, 16 show the reverse sides of the implements pictured on plates 11, 13, 15.

JESSE WALTER FEWKES

By WALTER HOUGH

JESSE WALTER FEWKES was born in Newton, Massachusetts, November 14, 1850, son of Jesse and Susan Emeline (Jewett) Fewkes. His early education was in the schools of the period. At the age of 21 he was fitted for college and entered Harvard without conditions. Graduating with honor in natural history in 1875, he was elected to the Phi Beta Kappa society. As a student in the Agassiz school at Penikese Island in 1873 he was drawn under the inspiring influence of this great teacher and determined to make marine zoology his life work.

Post-graduate work in natural history resulted in his receiving the degrees of A. M. and Ph. D. Subsequently for three years he studied zoology at Leipzig and under the Harris fellowship spent several months at this work on the Mediterranean coast at Naples and Villa Franca.

Appointed assistant in the Museum of Comparative Zoology at Harvard he held this position for many years in charge of the lower invertebrates. This and other duties connected with zoology occupied his attention until 1888, when during a trip to California he became interested in ethnological problems. It may be noted that his literary product during his career as a naturalist numbers 69 titles. Dr. Fewkes had become widely known as a marine zoologist.

Leaving this work behind he took up his ethnological studies among the Pueblo Indians under the patronage of Mrs. Mary Hemenway of Boston. His first work in this new alignment was in the summer of 1889 and 1890 at the pueblo of Zuñi, New Mexico. At this period he was first to employ the phonograph in recording Indian songs, many records being made and later with other cylinders transcribed by Mr. B. J. Gilman for the Journal of American Ethnology and Archeology under the titles Zuñi Melodies, and Hopi Songs. The journal mentioned was founded by Dr. Fewkes who was also editor; volumes 1–5, 1891–1895 appeared. A majority of the articles appearing in this journal were on his researches at Zuñi.

The ceremonials of the Pueblo tribes forming as they do so large an element in the social life of these Indians forcibly attracted his attention. Setting about to record ceremonies with the detail of a naturalist he chose the Hopi as more amenable to study and shortly had so impressed them by his friendliness that he was initiated into the Antelope and Flute priesthoods. The Hopi study resulted in a long line of papers on religious ceremonials and traditions. Especially interesting is the Snake dance on which Dr. Fewkes published several authoritative papers.

JESSE WALTER FEWKES
1850—1930

The traditions of the Hopi led Dr. Fewkes into the prehistory of this tribe. The explorations at Awatobi and Sikyatki in 1895 revealed a new type of Pueblo art pottery, the decorative designs of which Dr. Fewkes was enabled to interpret through his knowledge of the existing cult art. Here was demonstrated his training as a naturalist.

Widening his field, Dr. Fewkes excavated many ruins and in some cases preserved typical examples by judicious repair. His work in this respect at Mesa Verde is of great and permanent value. Having a basis in his knowledge of Hopi cult Dr. Fewkes was enabled to elucidate many problems which arose during his explorations. While the Hopi terms might not be thought applicable to the Pueblo complex in its entirety yet the unity and continuity of this culture permit the use of the Hopi key. The collection of thousands of specimens mostly in the U. S. National Museum is a striking evidence of Dr. Fewkes's indefatigable labor in Pueblo archaeology. It is most fortunate that this body of material has been preserved for study.

In 1895 on his coming to the Bureau of Ethnology as ethnologist, Dr. Fewkes began the intensive research into the ancient Pueblo ruins which is being carried through to such success today. From 1902 to 1904 Dr. Fewkes worked in the West Indies, the important monograph, The Aborigines of Porto Rico, appearing.[1] This study did more than any other to give a comprehensive idea of the archaeology of the West Indies.

In the following year he undertook the exploration of the Gulf Coast of Mexico, publishing the results in a paper entitled, Antiquities of the Gulf Coast of Mexico. Returning to the Pueblo field he repaired the great ruin of Casa Grande in southern Arizona, and unearthed and repaired several of the important Mesa Verde ruins bringing them to the present state in which they are seen by thousands of tourists yearly. The idea of the educational and economic value of typical ancient ruins repaired and made accessible was promulgated by Dr. Fewkes who carried on some of this work through the National Park Service.

Dr. Fewkes was accustomed to take the field for a portion of every year. In 1910 he visited the Isle of Pines, Cuba, and the Grand Cayman. In 1912 he made a trip to the Lower Antilles excavating sites in Trinidad. To aid in his West Indian studies he spent the winter 1913 scanning the West Indian specimens in various European museums and continued his trip into Egypt.

The discovery of a type of pottery characteristic of the Mimbres valley, New Mexico, is to be credited to Dr. Fewkes who issued several publications on the subject from 1914 on.

[1] BAE-R, 25.

In 1918 Dr. Fewkes was appointed chief of the Bureau of American Ethnology and during this year he continued archaeological work in the west. At Mesa Verde he uncovered two unique prehistoric monuments, the Sun Temple and the Fire Temple. Carrying on the administrative work of the Bureau, Dr. Fewkes found time to continue researches in Pueblo archaeology, close to thirty papers appearing in this period.

He also planned archaeological work in the southern states especially to define the limits of possible connections with the West Indies. At Weedon island, Tampa bay, Florida, he excavated a large mound and followed with a reconnoissance of the Florida south coast.

The infirmities of age at last began to retard his progress. His last field work was the excavation of Elden Pueblo near Flagstaff, Arizona. On January 15, 1928, Dr. Fewkes retired on account of disability, and lingering until May 31, 1930, he passed on.

Dr. Fewkes was an outstanding man of science, combining the qualities necessary to produce foundation work. As an anthropologist it is evident that his success in this branch was greatly promoted by his training as a zoologist. Almost exclusively his work is the record of personal observation. Because of this it will grow more valuable with time. It is true that his methods were largely tinctured with those of the pioneers of anthropology, and he found it difficult to coincide with the processes of modern expanded science, preferring, for instance, to omit researches in stratigraphy from the study of culture. Like many of the old school he possessed an extensive foundation of general culture which in effect militated against pursuing a specialty.

Dr. Fewkes received many honors from learned societies and other bodies. He was made Knight of the Royal Order of Isabella la Catolica in recognition of his distinguished services at the Columbian Historical Exhibition at Madrid in 1892. From King Oscar of Sweden he received a gold medal "Literis et Artibus" for his discoveries in anthropology. He was a fellow of the American Academy of Arts and Sciences, member of the National Academy of Sciences, and officer or member of many scientific organizations. He received the degree of LL. D. for service in anthropology from the University of Arizona in 1915.

Dr. Fewkes was above average height with blue eyes, sandy hair and beard. He had a good presence, and would be distinguished in any assembly. He was friendly and had a talent for making friends that stood him in good stead in his contact with the Indians.

He married Florence Gorges Eastman who died in 1888 and again was married to Harriet Olivia Cutler whose death preceded his only a few weeks.

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UNITED STATES NATIONAL MUSEUM,
WASHINGTON, D. C.

HENRY WETHERBEE HENSHAW

By F. W. HODGE
and C. HART MERRIAM

HENRY WETHERBEE HENSHAW belonged to that school of pioneer American anthropologists who in the eighties and nineties were graduated from other professions and engaged in research pertaining to the science of man with no background save that of training in other fields and with a maze of falsities to penetrate; yet with this handicap they laid much of the foundation on which American anthropology now stands.

Mr. Henshaw, the last of seven children, was born at Cambridgeport, Massachusetts, March 3, 1850, and although receiving only the formal training afforded by the public schools, he early manifested a fondness for natural history, inherited from his mother, who, while not a naturalist, directed his attention as a child to the beauty of the bark and foliage of the trees, and pointed out their individuality and infinite variety of form and color. The Charles River marshes being only a few moments' walk from home, its banks, ponds, and ditches were the delight of his boyhood; here he "played Indian," digging and cooking clams as the Indians were supposed to have done on the same spot, and thus, we have no doubt, developing a nascent if perhaps unconscious interest in archaeology and ethnology. In these marshes young Henshaw became acquainted with their animal life, especially the birds, and having been given a gun while still a lad, his means for gathering specimens were augmented. The publication of the Pacific Railroad Reports and the Smithsonian Check List of Birds were a godsend to him; he memorized the scientific names of the common birds while still in his early 'teens.

In 1865 he entered the Cambridge High School to prepare for Harvard. A fellow student was William Brewster, with whom he became acquainted and their kindred interest in ornithology developed into close association and a warm friendship that ever continued. They worked together, Henshaw under Brewster's tuition, the two spending much time in gathering specimens of birds. Henshaw became associated also with Ruthven Deane and Henry Purdie in collecting, and gained much also from Emmanuel and E. A. Samuels, C. J. Maynard, and R. E. C. Stearns.

In 1869, a few months before the examinations for Harvard, Henshaw's health gave way. In the fall he was invited by Captain Frank Webber to spend the winter in Louisiana aboard the Coast Survey schooner *Varina*. Continuing his ornithological studies and collections until the following spring, he returned home and resumed with Brewster his collecting trips. In the fall of 1871, Henshaw, Brewster, Deane, Purdie, and later W. E.D.

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Scott and Ernest Ingersoll, met at Brewster's home, first to read and discuss Audubon's Birds. These gatherings resulted in forming the Nuttall Ornithological Club, as a natural sequence of which the American Ornithologists' Union sprang into existence, with its noteworthy journal, The Auk.

In the fall of 1870 Henshaw's father moved to Grantville, now Wellesley Hills, and soon afterward the son made the acquaintance of Isaac Sprague, the artist, who had been associated with Audubon and who was then making drawings of plants for Asa Gray; and he met also Bradford Torrey. Ever eager to learn, and being of a serious and earnest nature, the youth gained much from these early acquaintances and was ever proud of the knowledge he had derived from such living sources.

During the same autumn Henshaw went to Florida on a bird-hunting trip, which lasted until the close of the following May. Some time later, at the instance of T. M. Brewer, he was offered the secretaryship of the Boston Society of Natural History, which he declined, the confinement of an indoor position not appealing to him; but his scientific reputation was becoming established.

In July, 1872, Henshaw received a telegram from Professor Spencer F. Baird, Assistant Secretary of the Smithsonian Institution, asking if he would go to Utah as natural-history collector on the Wheeler Survey. Asking for further information, he received it in the form of another message: "Report immediately at Salt Lake City; pay transportation and take receipts." With no further advice Henshaw undertook the journey and reported to Wheeler. His first trip from Salt Lake City was a collecting one with Dr. H. C. Yarrow. By a strange coincidence, Mr. E. W. Nelson, who many years afterward succeeded Henshaw as Chief of the United States Biological Survey, was collecting in the same neighborhood, unknown to each other.

The season of 1873–1874 took Henshaw among the Apache; but his prime interest continued to be ornithological. In 1875, however, the operations of the Survey continuing to California, Henshaw had his first taste of archaeological work when he visited Santa Cruz island for the purpose both of making natural history collections and of participating in the archaeological investigations of Paul Schumacher for the Smithsonian Institution. Remaining on the island a short time, Henshaw went with Yarrow to Moore's island, ten miles from Santa Barbara, where three weeks were spent in excavating burial places that abounded there.

The Wheeler Survey having been absorbed by the United States Geological Survey in March, 1879, Henshaw was offered by Baird, who had

become Secretary of the Smithsonian Institution, the position of Curator of Herpetology in the National Museum; but this he declined, and in 1880 accepted the invitation of Major J. W. Powell to attach himself to the recently established Bureau of Ethnology, with the understanding that if the new field proved to be congenial he should make it his life work. Powell always believed that a biological training was a prerequisite to a successful career in anthropology.

Powell long had in mind a classification of the Indian linguistic families of America north of Mexico, and the means now having been afforded, Henshaw's first assignment in the Bureau was to this task, which included also the preparation of a map exhibiting the earliest known habitat or the regions inhabited by the Indians at the time they were first met by white men.

It was Henshaw who proposed and followed the biological method of linguistic stock precedence and nomenclature, and while he, with the aid of others (notably Gatschet, J. O. Dorsey, and Mooney), conducted the research incident to the classification, Powell was the moving spirit, and the final result, expedited by the approaching appearance of Brinton's The American Race, was published in 1891, under Powell's authorship but with credit to Henshaw, in the Seventh Annual Report of the Bureau.

Directly connected with the linguistic classification of Indian stocks was the preparation of a synonymy of tribes and settlements north of Mexico, which Powell also had long in mind and which became indispensable to the compilation of materials on which the linguistic stock classification, and the linguistic bibliographies of Pilling, were largely based. The results of the previous labors of Otis T. Mason and of Garrick Mallery in this direction were taken over by Henshaw in 1885, the entire staff of the Bureau for a while was later assigned to the task, and in time the synonymy was so elaborated by Henshaw that it became the skeleton of the Handbook of American Indians North of Mexico published by the Bureau in 1907–1910.

At the inception of these researches Henshaw found a serious lack of linguistic information respecting some of the more obscure groups of Indians in California, Nevada, and Washington; therefore as opportunity offered he journeyed to the Pacific slope where he spent many months in 1880–1881 and 1883–1884 in an endeavor to elucidate the problems then involving several lesser linguistic families. In California he visited the Washo and Panamint, the remnant Chumash of San Buenaventura, Santa Barbara, Purísima, Santa Inez, San Luis Obispo, and Santa Rosa island, as well as San Miguel and San Antonio which were shown to be of

the Salinan stock, and four Yuman groups about San Diego and San Luis Rey. Vocabularies from these groups proved their linguistic relationship or independence and added much to the meager knowledge respecting many of them. During the first of these journeys Henshaw conducted investigations also with respect to the Tenth Census, making it the opportunity to obtain information on the status of the Indians at that time, their advance in civilization and education, their future needs, and many ethnologic data for study and publication. A large body of information was gathered, but lack of means prevented elaboration into published form.

In 1888 Henshaw gathered linguistic data among the Cayuse, Umatilla, and Nez Percé, in Washington, and continuing into California, made similar studies among the few Indians about Monterey and Santa Cruz, thereby substantiating what was designated the Costanoan family. From the two survivors who could recall it, a vocabulary sufficiently copious to enable the determination of the Esselenian family was recorded, and similar research was conducted among six survivors at Tomales bay who spoke a dialect of Moquelumnan.

The burden of the directorship of the growing Geological Survey bearing heavily on Powell, he relegated to Henshaw the details of administration of the Bureau of Ethnology about this time, these additional duties being carried on during the following four years. The health of Henshaw suffering under the strain, Powell sent him, in the spring of 1892, to the Southwest and to southern California where he resumed his field investigations and gathered collections for the Bureau's exhibit at the Chicago Exposition. He remained in California until the following spring, when, his condition not improving, he resigned from the Bureau and in December, 1894, sailed for Hawaii, where he remained until 1904, returning to Washington early in 1905 with health more or less restored. While in Hawaii he became a citizen of the little republic, but again became an American when Hawaii was annexed in 1898. In the islands he applied himself assiduously to photography, in which art he became an expert, and the demand for his pictures was so great that they found their way to many parts of the world. His negatives were purchased in 1920 and presented to the National Geographic Society.

In June Henshaw entered the Biological Survey as Administrative Assistant; in December he became Assistant Chief, and on June 1, 1910, succeeded Dr. C. Hart Merriam as Chief thereof, a position which he held until December 1, 1916, when he retired from the service. His health again became precarious, and during the last years steadily declined until, at Washington, death came on August 1, 1930, in his eighty-first year.

Throughout the years when scientific activity in Washington was in its renaissance, Henshaw was a leading spirit. Becoming a member of the Anthropological Society of Washington in 1880 and of its council in 1882, he was ever active in promoting its aims. He became editor of the American Anthropologist (old series) when in its second year, a labor which he continued through the ninth volume (1896). Henshaw and Holmes were among the founders of the Cosmos Club, that gathering-place of scholars so well known throughout the land.

Of an exceptionally modest disposition, Henshaw was inclined to retire to the background rather than to seek preferment above others. He was possessed of a subtle wit, was forceful, frank, and lucid in the presentation of scientific testimony, and while caustically criticized for his conclusions in regard to animal carvings from mounds in the Mississippi valley, no one ever had cause to say that he was not the soul of honor.

The titles of Henshaw's published anthropological writings in addition to various book reviews, follow:

Cliff House and Cave on Diamond Creek, New Mexico. Report on U. S. Geographical Surveys, 7: 370–371, 1879.

[Introductory note to] The Account by the Pilot Ferrel of the Voyage of Cabrillo along the West Coast of North America in 1542. *Ibid.*, pp. 293–314, map.

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Who are the American Indians? *Ibid.*, 2: 193–214, 1889.

The Ethnologic Affinities of the Ancient Etruscans. *Ibid.*, 3: 36, 1890 (Note.)

A New Linguistic Family in California. *Ibid.*, 3: 45–49.

Omaha Religious Practices. *Ibid.*, 3: 50. (Note.)

The Descendants of Palæolithic Man in America. *Ibid.*, 3: 100-102. (Note.)

Mound Exploration in Georgia. *Ibid.*, 3: 102–104.

Archæologic Discovery in Idaho. *Ibid.*, 3: 200. (Note.)

Drum Telegraph of the Cameroon Natives. *Ibid.*, 3: 292. (Note.)

Elephant Mound. *Ibid.*, 3: 294. (Note.)

Indian Origin of Maple Sugar. *Ibid.*, 3: 341–351.

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Popular Fallacies respecting the Indians. *Ibid.*, n.s., 7: 104–113, 1905.
Many brief articles on Indian tribes and an article on "Popular Fallacies" in Handbook of American Indians North of Mexico, 1907–1910.
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MUSEUM OF THE AMERICAN INDIAN, HEYE FOUNDATION,
NEW YORK CITY

August 29, 1930

Dear Mr. Gifford:

Replying to your letter of the 22nd instant, I regret to say that I shall not be able to write the obituary notice you wish of Henry W. Henshaw. A similar request has come from Science.

I first met Henshaw in 1872. During that year we were on rival government surveys—he on the Wheeler Survey, I on the Hayden. At that time W. H. Holmes (once chief of the Bureau of Ethnology) and G. K. Gilbert (America's leading geologist) also were on these rival surveys—Gilbert with Wheeler, Holmes with Hayden.

One of the results of these 1872 contacts was that Henshaw, Gilbert, Holmes, and I became intimate personal friends—an intimacy that continued until the time of Gilbert's death.

Henshaw, as you know, prepared at Major Powell's request the historic map of the Indian tribes of North America—a map that with the help of numerous collaborators represented the then extant knowledge of the areas occupied by the various stocks and tribes. Naturally it was a great advance over Gallatin's map—which for its period was equally important.

At the time Henshaw was engaged in the preparation of the map he was at work also on a Synopsis of North American Tribes (the title of which—Tribes of North America—was subsequently changed to Handbook of American Indians). Of this material Henshaw published a large quarto brochure, copies of which were distributed to several American anthropologists for suggestions and additions.

The work was so stupendous and required the labor of so many men that it was not completed until long after Henshaw had left the Bureau—in fact not until 1907 and 1910, when Hodge, then chief of the Bureau, succeeded in publishing it for the benefit of all students of American Indians. Hodge, as you may or may not know, was Henshaw's personal assistant at the time Henshaw brought out the Powell map and the large quarto sample brochure of the contemplated Handbook.

Henshaw was a versatile man of many interests. As a young man his first love was ornithology. His father lived at Wellesley near Cambridge. Cambridge was then the home of William Brewster, Thomas M. Brewer, Ruthven Deane, C. J. Maynard, and other ardent young bird students whose names now occupy high places on the roll of honor of American ornithologists.

In this connection it should be recorded that Henshaw and William Brewster while young became our most proficient field ornithologists, and in the preparation of bird skins set a standard which has been followed to the present day. Half a century ago I was an interested witness of skinning matches between Robert Ridgway, Dr. Elliott Coues, Henshaw, and Brewster. The two latter were nearly a tie. If my memory serves me correctly, Henshaw skinned, poisoned, stuffed, labeled, and completed the preparation of a small bird inside of three minutes.

From early manhood until well after middle age Henshaw was enthusiastic in his work and entertaining in conversation—one whose companionship and advice were sought. At the same time he was modest and diffident, and only rarely could be induced to present papers before scientific societies.

Major Powell intended that Henshaw should succeed him as head of the Bureau of Ethnology; but Henshaw dreaded to assume authority over his associates and was extremely sensitive to criticism.

On leaving the Bureau he went to the island of Hilo, Hawaii, where he remained for about ten years. He made field studies of Hawaiian birds and prepared a paper on the ornithology of the Islands. During the same period he took a series of rather remarkable photographs of island scenery (using glass negatives of large size and permanent platinum paper for the prints). The sale of these through a business establishment in Honolulu furnished him a comfortable livelihood during his long period of self-imposed exile.

On his return to Washington I secured his appointment as administrative assistant on the Biological Survey; and later, on resigning from the Survey, named him as my successor.

After resigning from the Biological Survey he became interested in the work of our mutual friend, Dr. Albert Mann, with whom he associated himself in the study of Diatoms, showing much skill in the preparation of microscope slides.

During his later years he was much alone, especially evenings, and amused himself in assembling a number of albums of photographs (mainly taken by himself), and in listening to musical victrola records, of which he had a goodly number.

His final mental breakdown may be attributed, I think, to the loneliness of his declining years.

In beginning this letter, I had no intention whatever of writing so much. However, if any of the facts here given are of value to you or whoever writes the notice they are at your disposal. Dates and more exact information could be easily furnished were I in my Washington home.

Very truly yours,

C. HART MERRIAM

LAGUNITAS, CALIFORNIA

BOOK REVIEWS

METHODS AND PRINCIPLES

Social Research. A Study in Methods of Gathering Data. GEORGE A. LUNDBERG. (New York: Longmans, Green and Co., 1929, 308 pages.)

This is a clear, readable, and, I think, a truly useful account of scientific method from the point of view, now so fashionable in the social sciences, that identifies "scientific method" with "quantitative method." For Lundberg science is "a technique of deriving knowledge about any type of phenomenon in the universe and then applying this derived knowledge for purposes of prediction and control." The functional aspect of modern social science is therefore the same as that of modern physics or chemistry. The historical-geographical method (Kroeber's "depiction") is recognized as a preliminary stage leading ultimately, through comparison, to the determination of uniform sequences. But such uniformities can chiefly, or perhaps only, be determined by quantification. "The statistical method is in any case the only method whereby types can be discovered and large numbers of cases classified" (p. 208). Therefore, in order for social science to become truly scientific, it must collect its data with a view to getting data that can be treated statistically. Data can be treated statistically only when they can be broken into equivalent units. The interest therefore lies in such devices, external to the observer, that make possible such objective categories: the schedule, the questionnaire, the "scale." On the other hand, the life history, the interview, the autobiographical document, may serve a purpose in suggesting hypotheses, but they cannot be treated "scientifically," i.e., "statistically." "The chief obstacle to the scientific utilization of case records and life history documents is the difficulty of . . . . generalizing them statistically" (p. 173).

The future historian of science, reflecting upon the scientific philosophy that Lundberg has here ably presented, will recognize that in the early part of the twentieth century, the social sciences, not having had time to work out methods in accordance with their own materials and problems, set out to imitate the natural sciences, which by that time had achieved success and prestige. He will go on to tell our descendants that it was only an assumption that the goal of social science lay in prediction through generalization (although it may turn out that is indeed its goal). And in the second place, if he is any sort of historian of science at all, he will point out that statistical procedure is not the same as natural science. The term "statistics" must be very much enlarged if the procedure of the zoologist, distinguishing a genus or a family, is to be called statistical. Over and over again the natural scientist gets his types, arrives at his generalizations by studying cases, by getting intimate with them, by coming to know each in the light of the others, and then by a method that is quite informal, deriving a type from them. No mathematical handling of equivalent units is involved at all. If data are to be treated only by means of objective devices that permit statistical treatment, the cases can never be completely known, but only in fragments.

These objections receive support from the experience of ethnologists. Every general account of crisis rite or customary ceremonial involves an informal generalization of this sort, one made either by a native or by the ethnologist. At present ethnology is in that simple condition where the reputation of the ethnologist for accuracy and insight is the best guarantee of the validity of his account. But mere accuracy is not enough; he must be able to see sympathetically the meaning of the overt behavior in its full social context. We welcome the development of objective devices in ethnology; but it is hard to see how they can ever be more than auxiliaries, how cultural data can ever be reported so as to be treated only quantitatively. A culture is not a sum, it is a, yes, a "configuration"; the relation of the part to the whole and to the other parts is important. It is by no means obvious that observation and reporting would be more useful if it were done by filling out schedules. Intimate, thorough, and sympathetic scrutiny of the total situation is what is needed. At least it is too soon for the social sciences to confine themselves to data that can be treated quantitatively. The study of society, whether civilized or primitive, still has the opportunity of working out its methods, not by imitation, but in accordance with its own needs.

ROBERT REDFIELD

Myths of the Origin of Fire. An Essay. Sir JAMES GEORGE FRAZER. (London: Macmillan, 1930. Pp. vii+238. $4.50.)

In this pleasing essay Sir James Frazer gives a brief account of the myths regarding the origin of fire. He draws his material from many ethnographical areas—Australia, Oceania, Asia, Africa, the New World, modern Europe, and ancient Greece. In a concluding chapter the author calls attention to the striking similarities between motifs in widely separated regions, and also to the limited number of types of motifs which these myths show. These latter he presents in their psychological or presumed evolutionary significance rather than in their geographical and cultural setting. Especially prevalent are the myths which explain why fire is resident in the respective woods from which the natives secure it.

WILSON D. WALLIS

Die Wahrheit über das Zweigeschlechterwesen durch die Gegner bestätigt. JOSEPH WINTHUIS. (Besonders käufliche Beilage zur Zeitschrift für Völkerpsychologie und Soziologie, Jahrgang 6: 1–100, 1930.)

This is a reply to a criticism, published in the December 1929 number of Anthropos, of the author's Das Zweigeschlechterwesen (reviewed in a recent number of the Anthropologist). "Not for love of the fray have I taken up the pen, but for love of truth, that truth may triumph. For nothing is more detrimental to Christendom and culture than the triumph of error. 'The truth shall make you free.' "

The author defends his previous thesis that primitive thought, at least in Oceania, particularly in Melanesia and Australia, is shot through with sex motif. It appears abundantly in myth, conversation, art, religion, ceremony.

WILSON D. WALLIS

Phonophotography in Folk Music. MILTON METFESSEL. (The University of North Carolina Press, Chapel Hill, 1928, x, 181 pp., 68 figs.)

This book gives the results of Dr. Metfessel's experiments at the Iowa University Psychological Laboratory in methods of photographing the human voice in song, and presents in detail the conclusions reached from a study of the sound waves. He has built a portable apparatus, using motion picture films for recording sound, for field work, which is fully described, and pursued some of his researches among the southern negroes. His chief interest seems to have lain in the vibrato as the essential element of beautiful emotional singing, and as a measurement of the expression of emotion in music. An effort to compare the vocal characteristics of different noted singers was also included in the researches.

Although Dr. Metfessel, and Professor Seashore who wrote the Introduction, seem to have been primarily concerned with the vibrato, they claim, with entire justification, that the photographed sound waves are a complete record of everything conveyed by musical expression, and that these may be measured and analyzed by instruments of precision so as to permit of the isolation, description, and classification "of all types of variants, from the cold, non-emotional, and mechanical production of tones, to the most highly artistic expression of aesthetic emotion."

They speak rather disparagingly of the methods anthropologists have hitherto been forced to use in recording and studying primitive music by means of phonograph records, of their reading and interpreting them by hearing only, and transcribing them in ordinary notation, although these statements are not exactly true.

It is stated that the cost of reducing four-minute records by the new method to film and score for publication would lie between fifty and seventy-five dollars apiece, but claimed that this price is not prohibitive when it is considered how vastly superior is the product to that hitherto used by anthropologists, and the practically unlimited amount of time that may be spent in special study and interpretation of the records without wearing them.

For the kind of study which primarily interests these investigators, such as variability of vibrato, attack and release of tones, various manifestations of emotion and certain phases of physiological psychology, no doubt the film records, and a moderate number of them, may suffice. Anthropologists, however, are not more interested in these problems than in discovering the characteristic features of musical composition of each group of people to be studied, and in comparing tribal styles. This entails not only the discovery of peculiarities of voice production likely to be common to whole racial groups of singers (as certain phonetics may be to large masses of humanity speaking a single language), nor even the range of individual variation in such minutiae, but involves as well the larger survey, both in number and structural features of composition, etc., of tens, or more often hundreds, of songs belonging to each tribal group. For it appears that styles of musical composition may be vastly different for different kinds of songs used by one and the same group, and to compare the music as a whole, of different groups, involves securing records of literally thousands of songs. At this rate, the present cost of the Metfessel-Seashore apparatus is prohibitive, I venture to say, to all anthropologists. It is

not alone prohibitive in money cost, but in the cost of human labor. In order to secure any intelligible results from the waves, it is apparently necessary to expend upon each one an appalling amount of preliminary work, from the "hand counting" under artificial light, of the millimeters covered by each wave, to complex mathematical calculations. At least that was the case sometime before the book was published, when the present writer personally examined the apparatus at Iowa.

However desirable it may be to have complete and entirely accurate visual records from which not only the most minute but also the largest aspects of musical study could be made, it is necessary in the final stage, to present the music in notation capable of being read and comprehended, in order to render it intelligible to general students of anthropology and psychology and the mass of the musical public. Dr. Metfessel himself resorts to it and makes in the use of it as great compromises as, if not greater than, the compromise notations adopted by different anthropological students of music. Thus, except for some of the more minute details of sound production, a far more enormous amount of labor has been involved in arriving at a workable presentation, than is needed in the less scientific notation, to arrive at which, itself, is long, slow, careful work when properly done. This ordinary notation may be sufficiently altered to take account of most of the features essential to purely anthropological, if not to psychological, study. That the more minute features are also important, is not to be doubted. But it is somewhat doubtful if the conditions which may influence some of these features of vocal performance have been, or can be, sufficiently controlled and isolated.

It is true enough that no ordinary notation can express all that is conveyed by sound, as the complex wave can. This has long been observed and admitted by all thoughtful musicians. But it has this present advantage over the wave method—that everything noted is, or can be made, intelligible, whereas the complex wave has not yet proved entirely amenable to analysis. An important point to be mentioned in connection with the analysis of the sound wave is that of phonetics. Certain vowels, all pitches, and their duration, seem capable of isolation, but other vowels and many consonants are evidently not clearly identifiable. It has been necessary to resort to audible records continually in determining and placing the words. If this is true of familiar English texts, it will be much more true of the sounds of exotic languages, with their obscure and often very difficult consonants, so that exclusive reliance on film records is as yet far from being possible.

All this is not intended to convey the idea that the Metfessel apparatus is not a great step in advance. As a means of procuring exact visual records of sound, in all its ramifications, the clever devices developed at the Iowa Laboratory meet the requirements. The fact that similar mechanisms have been developed elsewhere, although at the expense of much less mobility of apparatus and even greater cost, does not detract from the achievement of Dr. Metfessel. Anthropologists have long recognized that the phonograph method alone is inadequate. Many types of mechanical apparatus for recording and transcribing have been examined for many years, in the hope of finding more accurate and practicable methods, not only from the standpoint of cost in money, but in time, which is an essential factor. That the

present form of this new apparatus does not meet all the practical requirements, does not prevent anthropologists from hailing it with interest and appreciation as the forerunner of what, it is to be hoped, will evolve into something more adaptable to their particular needs.

Dr. Metfessel's book contains many graphs of sections of songs recorded by the wave method, some accompanied by ordinary notation, some not, and by other analytical features. There are series of motion picture strips, depicting changing facial expression of the singers, taken synchronously with the song records. Each song example is accompanied by detailed discussion.

The author has been able to isolate certain vocal ornaments which, he leads his readers to infer, would not be heard unless the reader had before him a visual record of what was happening, as well, which seems a little peculiar. Throughout the book Dr. Metfessel is prone to class the ears of all musicians as crassly incapable of finer perception and to consider that those trained in European music invariably interpret pitches intermediate to European chromatics in terms of the nearest of these. This may be true of numbers who claim a knowledge of music and is notoriously true of many concert singers, but is not applicable to many instrumentalists and to hundreds of naturally gifted people. He states that probably some of the vocal ornaments are not confined to negro singing, but are characteristic of it as contrasted with artistic singing. He says "The question as to which of these patterns just described are distinctively African Negro must await phonophotographic studies of European and African folk song."

Discussing scales, the author is inclined to believe that intervals, the limits of which in the course of repeated appearance during a song tend to center at certain points, are intended to be defined by these points. He thus accounts for an "intentional" neutral third, the upper limit of which lies midway between a major and minor third above the lower. This is a favorite point of discussion and speculation by many students, who have not relied on visual records to observe this interval. Before considering it to be intentional in the particular song or songs in which it was observed, it seems to me that studies should be made (1) on the degree of ease with which a given type of third may be sung. It may be that minor thirds are more often perfectly reproduced than major, at least with some individuals, and that certain factors tend to influence the singing of major thirds toward neutral. In years of teaching and chorus and glee club work, I have noted that thirds tend to give trouble, even with trained singers of a certain type. (2) One of the conditions affecting proper pitching of tones from the standpoint of the melody, is its accompanying text, with its word intonation. The relation of phonetics and language to tone production in song is a subject about which practically nothing is known at present and which, it seems likely, is very important. (3) The propensity to "undersing" certain intervals, perhaps notably the third, may also be the result of emotional disturbance, or even that of bad air. (4) It should also be kept in mind that any interval in a song, except the first and last, is indissolubly linked, each of its delimiting tones serving as one limit of the intervals lying on either side of it. Such modifications of pitch from European standards as may be observed, not only in

primitive, but in artistic singing, may thus apply as much to the surrounding intervals as to the one under discussion, and either of the surrounding intervals, in its own nature, may affect the rendition of the one in question. The pitch may be influenced, much as stellar bodies are pulled in space by the presence of other bodies, by the general direction of the melody and the prominence of certain of its tones, or by a tendency on the part of the singer to attenuate or actuate melodic curves.[1]

H. H. ROBERTS

An Introduction to Social Anthropology. CLARK WISSLER. (New York: Henry Holt & Co., 1929. X, 392 pp.)

A cursory inspection of Dr. Wissler's latest book might suggest that it is a work of the order of Tylor's Anthropology, the chapter headings indicating such topics as "The Economic Base," "Marriage," "Animism," "Magic," etc. Actually, the author's purpose, as explicitly set forth in the Preface, is a quite different one. He has written a text for students of the social sciences not specializing in anthropology but eager to acquire "a minimum of descriptive data and as comprehensive an interpretative view as time permits." Dr. Wissler solves his problem by "presenting the research leads of anthropology in their historical sequences."

Accordingly, the chapter on "The Tribe" begins with references to Morgan, Maine, Bachofen, and McLennan; "Relationship Systems" with Morgan; "Mythology" with the Grimm brothers, Max Müller, Kuhn, and Brinton. Naturally no two anthropologists would agree as to either the topics that should be stressed or as to the comparative importance of "research leads." Personally I am not prejudiced against the study of kinship terms, but I consider it odd that a whole chapter should be devoted to it. On the other hand, the the slighting of technology and the omission of art seem inexplicable in view of the important results achieved by the ethnographic approach and Dr. Wissler's own contributions to these departments of our science.

In the judgments on specific points of anthropological fact and theory there are naturally some that provoke dissent. To the reviewer the exclusive emphasis on *primitive* culture in the initial definition of anthropological aims seems exaggerated (14 ff., 55), being logically unwarrantable and even practically impossible at times. In setting the upper population limit of the political primitive at 2,000 souls (36) Dr. Wissler evidently forgets dozens of African cases. In the South Seas—contrary to a statement restricting the culinary art to women (59, 156)—men are known to prepare meals quite regularly. Unless my authorities have been superseded, rye and oats do not date back to the Neolithic in Europe (69). I think it is unfair to say that anthropologists are not interested in political organization (130). The dearth of relevant material for America owing to changed modern conditions seems to have misled the author here; the Polynesian and African data

[1] H. H. Roberts, Variation in Melodic Rendition as an Indicator of Emotion. Psychological Review, 34: 463–471, 1927.

would tell a different story. It is surely wrong to say that all recent American students reject correlation of kinship terms with *any* form of social procedure (182); whatever criticism may be justly leveled at extremists, some correlations are among the most certain results not only of anthropology but of all science and logic. Finally, the omission of Von Hornbostel's name in the reference to primitive music (278) seems curious.

One of the most attractive features of the book is undoubtedly the abundant use of material quoted from field reports. Dr. Wissler, it is clear, strongly felt that this was an appropriate, as it is the only possible, compensation for lack of field experience.

The book undoubtedly requires a good deal of supplementary activity on the part of the instructor. But with such cooperation it certainly can become an effective instrument for vindicating the ways of anthropology to a wider circle. Last summer I used it with precisely the type of students for which it was designed and felt at the close of the term that they had gained some conception of the major problems of anthropology and of some of the achievements made in the objective study of group phenomena.

ROBERT H. LOWIE

Outlines of Sociology. JOHN LEWIS GILLIN and FRANK W. BLACKMAR. (New York; Macmillan, 1930. 3rd ed., x+692 pp. $3.00.)

This is a very thoroughly revised and re-written edition of a college text which first appeared in 1915, and won wide favor. The first mentioned author appears to be responsible for the revision, although no statement to that effect appears. There is a treatment of social evolution and primitive society and primitive belief. Here, as in several other recent texts in sociology, one finds acquaintance with and references to the work of Goldenweiser, Lowie, Kroeber, Jenks, Wissler, Tozzer, and other American anthropologists. A chapter on culture has been introduced into this volume, but, curiously, there is no reference to the contributions made by other sociologists in this field (notably, Ogburn and Willey). Unlike most texts, there are numerous footnote references to authors and sources. The selected bibliography at the end of the volume does not appear to have been as thoroughly revised and modernized as has the treatment of chapter topics. The style is direct and easy, the exposition excellent. Each new moon sees a new sociology text come from the press of this country, and there must be enough now to sink a dreadnought. But there should be ample room on some new vessel for a text of the high merit of this one.

WILSON D. WALLIS

AFRICA

Races of Africa. C. G. SELIGMAN. (London: Thornton Butterworth, Ltd., Home University Library, 1930. 256 pp., 3 maps.)

This is a welcome volume, especially in view of the dearth of compendious works dealing with Africa as a whole in English. It is done with the authority

and conservatism expectable of Professor Seligman: it is marked by balance and plays no hobbies. The allotment of space is: Introduction, 15 pages; Bushmen, Hottentots, Negritos, 28; True Negro, 44; Eastern Hamites, 32; Northern, 29; Half-Hamites and Nilotes, 24; Bantu, 52; Semites, 16. All the more important peoples are mentioned and classified, and wherever data are available, the physical type is indicated and the culture compactly outlined. This plan scarcely makes for intrinsic readability, but renders the work one of convenient reference for orientation. The three sketch maps serve their purpose admirably, but an additional one showing the approximate situation of the principal tribes would have helped. One has not always the map at hand with which Professor Seligman says the book is intended to be read, and a localization like "eastern Kenya" is likely to be as vague in many visual imaginations as "western Minnesota" would be to most Europeans. There is no discussion of and scarcely any allusion to the Egyptian-diffusionist, Kulturkreis, or analogous hypotheses; but views like those which derive the Hamites from Asia and the Bantu from the lake region are approved as tentatively probable.

The book is different in emphasis of objective from any comparable one that might be produced in America. The first question always implicit is, Where did this people come from and what are its origins? This puts race and culture on the same plane and interweaves their consideration, where Americanists tend to separate them as much as possible. Culture as such is treated as it occurs among single people or groups of tribes, never as regards the wider distribution of its parts or aspects. Thus age-grading in east Africa would by us be treated as undoubtedly a single development, and attempts might be made to trace its source, spread, and relations to other facets of the cultures in which it occurred. Professor Seligman describes the institution separately, and without further comment, for the Galla (122), Masai (164), Akamba (221), because these are respectively Hamites, Half-Hamites, and Bantu. In short, the primary consideration is not cultures but the peoples that carry cultures—as the title Races of Africa correctly indicates. Brinton's American Race, now nearly 40 years old, is the last American counterpart. Naturally, anything like a culture area approach is out of the question. These remarks are made not in criticism, but in order to elucidate the aim and treatment of the book and to emphasize how heterogeneous—perhaps happily so—anthropology still is.

A. L. KROEBER

At the outset Dr. Seligman is aware of the difficulty under which he approaches his task of presenting an account of the races of Africa in the short compass of a volume of the Home University Library. This however, is not the most formidable of the obstacles. This is not a series which allows photographic illustrations, and there can be no doubt that clear presentation of a popular kind is almost impossible without some pictorial aid.

In reviewing a book, judgment must be made with regard to the subject matter and arrangement in relation to the public for whom the book is intended. Volumes

of the Home University Library are, I believe, intended for the general reader whose interest is due to a desire for a brief outline of many branches of knowledge. The Races of Africa is a book which will be of great service to students of anthropology; moreover it slips easily into the pocket, and is one which I should like to carry into the African field. This small volume contains a vast amount of accurate information, much of it from the author's well known personal research in Africa, and the rest from well accredited sources. To a university lecturer who is giving outline courses on the ethnology of Africa the book will prove a valuable aid.

I am nevertheless doubtful whether the general reader, actuated by no interest other than that of improving his general knowledge, will care to peruse the book carefully. Dr. Seligman has tried to make good the necessary absence of illustrations by very careful records of physical measurements, including cranial indices. In spite of the explanations, clearly given, I doubt whether the interest of the general reader will survive through the comparisons of figures of measurement.

Details respecting linguistic differences are clearly presented, but these, like physical measurements, are the aspects of the subject which are of the least interest to the general reader. Ethnology receives some attention but technology is neglected. I imagine that one who wishes to acquire an outline of the races of Africa is interested chiefly in occupations and culture patterns. As an ethnologist Dr. Seligman is over anxious that there shall be no misunderstanding, and no omission of points of scientific importance.

For the purpose of conveying an accurate though popular impression of the races of Africa I think the division of the continent into a few culture areas would have been of primary importance. Physical differences and linguistic divisions should have received a brief treatment, while the greater part of the book should have been devoted to pen pictures of types of life in the great natural zones. Had Dr. Seligman given a series of descriptions as realistic as his account of the life of the Kababish of Kordofan, the book would have had a well deserved popularity. The student must be grateful that Dr. Seligman decided to condense African ethnology rather than indulge in a bright and attractive presentation of modes of life.

WILFRID D. HAMBLY

Nuer-English Dictionary. RAY HUFFMAN. (Berlin: Dietrich Reimer [Ernst Vohsen], 1929. 63 pp.)

To the first fifty-three pages of dictionary in this little volume are added ten pages of grammatical notes. The work is entirely unpretentious and is not intended to be more than a preliminary introduction to the study of this African language. Nevertheless the work seems to be well done and the phonetic system used is clear and competent.

Nuer belongs to the Nilotic group of "Sudanese" languages and is thus related to such languages as Shilluk, Bongo, Dinka, and, further south, Masai, Nandi, and Latuka. Nuer does not seem to possess the gender system of Masai but it has a

number of characteristics that link it with Shilluk, which has been described in some detail by Westermann. The language seems to be essentially monosyllabic but it makes use of a number of internal stem changes in the manner of Shilluk.

On page fifty-four the author mentions "change in intonation" as one of the methods of forming the plural of nouns. In this respect again Nuer would seem to be parallel to Shilluk. The tone system of Nuer, however, is not discussed and the tones are not marked in the dictionary nor in the grammatical remarks. More and more we are coming to see that pitch is an essential characteristic of the great majority of African languages, including under this term Bantu, "Sudanese," Hottentot, and Bushman. It is true that there are African languages in which tone is morphologically unessential but these seem to be the exception rather than the rule.

E. SAPIR

Les Banyamwezi of East Africa. Father F. BÖSCH. (Published by Anthropos in the International Collection of Ethnological Monographs. R.M. 31.50.)

The task of reviewing some 542 pages supplemented by 50 illustrations might at the outset be somewhat forbidding were it not known that this well indexed volume is a presentation of the kind so much required in African ethnology. Of Father Bösch's illuminating and painstaking research among the Banyamwezi there is preliminary evidence in the pages of Anthropos.[1] These brief papers provide but an introduction to the substantial volume recently produced.

The work deals very thoroughly with religion, social and political organization, the cult of ancestors, totemism, and the system of magic of which many concrete examples are cited. There is also some careful research into the subject of family life and moral standards. The volume will be of great service to ethnologists, missionary workers, and those concerned with administration.

The object of Father Bösch has been to examine rather than to condemn. Unlike missionaries of a generation ago, who regarded the social pattern of aborigines as something to be hastily swept away, the investigator has realized that successful effort depends on a preliminary apprehension of the native point of view.

At the outset Bösch considers the difficult task of determining native ideas regarding a divinity. A list of names which are applied to some being, or beings, of a supranormal kind leads to the preliminary conclusion that the Banyamwezi are polytheistic. Bösch refutes this, however, by detailing conversations which seem to show that Kulanga Lyuba (He who directs the sun) and Kulunga (The perfect) along with many other titles refer to the same being. Incidentally, I was interested to find Kalunga mentioned among the Banyamwezi, as I recently found the name among the Ovimbundu of Angola and with the VaKuanyama.

Bösch insists that the god of the Banyamwezi is not the god of some early missionary teaching. But the decision of one even so competent as Father Bösch

[1] Le culte des ancêtres chez les Banyangwezi, bd. 20, p. 200 1925.

must be received with some reservation. In reviewing his own long experience and that of Father Van Wing, Torday[2] comes to the conclusion that Nzambi Mpungu is not a god but the ancestors. This was the ultimate finding with regard to the supposed theistic beliefs of the people known as BaKongo. Of the worship of ancestors among the Banyamwezi Bösch gives considerable evidence while admitting that the god is much neglected.

Tout le culte qu'il rend à Dieu dépend entièrement des circonstances, c'est un culte occasionnel.

Bösch was not able to find animistic beliefs relating to spirits dwelling in caves, rivers, or mountains, but belief in the survival of a soul after bodily death appears to be tenaciously held.

The mention of making new fire each year, likewise at the death of a king, adds to the already existing data some points of importance.

In part 5 the author begins the study of social morphology by a detailed consideration of the family in its broadest sense, that is as an institution involving marriage, education of children, property rites, and domestic slavery. The account of assistance given by the father and a midwife, when twins are born or the child is presented feet foremost, introduces some ideas which are new to me. Both father and midwife must be quite naked during the delivery.

Elle doit faire tout son service en costume d'Eve, le père assiste en costume d'Adam.

Twins are considered as important as royalty, in fact the royal drums and regalia are requisitioned for the welcome dance. Burial takes place in the pre-natal posture with the face directed toward that part of the country from which the deceased originally came. When the king is near death he is strangled, but the news of his decease is not made public. It is said that his condition is serious.

Father Bösch says of totemism:

It is an object or an animal, sometimes a tree or a plant, which they revere in remembrance of their ancestors.

Totemism has some intimate connection with the cult of ancestors and is likewise associated with magic. Bösch gives a long list of the totems, families who acknowledge them, and the places of origin of these families.

Magic is defined as

An assemblage of practices and superstitions [perhaps "beliefs" would be a better word] by which they seek to reach an end by means of hidden forces which are mysterious and not natural.

The account gives details of therapeutics, divination, and the organization of a caste of snake charmers.

The book concludes with a welding together of the parts of the social life in such a way as to show the psychological bearing of one aspect of the organization upon another.

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[2] Torday, Dualism in Western Bantu Religion and Social Organization. JRAI, 58: 225, 1928.

Unfortunately there is no technology in this volume, but no doubt Father Bösch has the information which would be of great value to those concerned with that subject in ethnological museums.

WILFRID D. HAMBLY

AMERICA

Ethnology of the Mayas of Southern and Central British Honduras. J. ERIC THOMPSON. (Field Museum of Natural History, Publ. 274, Anthropological Series. 17: 2-196 pp., 24 pls., 1 map, 1930.)

This is conscientious study of the ethnology of several relatively pure Maya villages in southern and central British Honduras made in connection with expeditions for the British Museum and the Field Museum. The Maya are mostly of Kekchi or Chol stock from the Alta Vera Paz region of Guatemala with a fair number of immigrants from Peten and Yucatan. It is compactly written and has a great deal of ethnological information for the bulk of the publication, especially as some sixty pages are folklore. There are several suggestions that a greater time spent among the people with more numerous informants might have revealed more data, particularly on the non-material aspects of culture.

The Maya in the region covered by the volume still follow the milpa system of agriculture undoubtedly inherited from pre-conquest days. New land is usually cleared each year, the same piece not being used again for at least four years. Practically all the original native plants are still cultivated with an addition of European plants, few of which have become of great economic importance. Life is still wholly bound up with agriculture and in spite of the nominal Christianization of the Indians, belief and ceremonial are almost completely aboriginal in flavor, being concerned primarily with agriculture and secondarily with hunting and fishing. Many of the aboriginal deities are still far more important than the Christian God and the Saints.

Excellent detailed accounts are given of a number of technological processes. It would be interesting to have more of these. The method of preparing tortillas, for example, is given in detail and is rather different from that emplóyed generally in Sinaloa and Sonora in Northern Mexico. The Maya place the metate on a stool about waist high, while the women of the west coast frequently kneel to it. This tortilla is pressed into shape on a banana leaf by the Maya, while on the west coast it is beaten out between the hands. The Maya grease the comal lightly, which I have never observed on the west coast, and they cook the tortilla slowly, whereas on the west coast tortillas to be eaten immediately are generally cooked very rapidly.

Among the many interesting survivals noted are the worship of the mams, the most active of the native deities who must be propitiated in all undertakings, the importance of the sun, moon, and morning star, the prominence of sorcerers, the use of the altar, censer and copal incense, ceremonial drinking, use of the pellet blow gun, poisoning fish and shooting them with the bow and arrow, the musical

bow with and without the gourd resonator, the bullroarer as a children's toy, and masked dances, particularly the deer dance, which was widely spread throughout ancient Mexico and Northern Mexico and appears to have survived in an almost pure aboriginal form. Mr. Thompson also gives some evidence, both historical and technological, to show that the hammock is pre-Columbian among the Maya and not brought in from the West Indies by the Spanish as is generally believed.

The section on the cultivated plants of the Maya of San Antonio has good short discussions of an historical nature. Mr. Thompson is of the opinion that there may have been a cultivated variety of the plantain in America before the conquest. This is so contrary to the prevalant opinion that he should have given some real evidence. It is suggestive, however, that according to some early seventeenth century Relaciones published in the Documentos Ineditos, cited by Mr. Thompson, one of the principal *wild* foods for the Huastecs in the vicinity of Panuco (Tampico) was the platano. It is difficult to imagine an introduced plant becoming an important source of wild food within less than a century.

The collection of folklore is very interesting in showing the interweaving of European and native concepts, particularly with regard to religion. Several versions of a magic flight myth are given which deserve analysis by an expert to determine whether they are aboriginal or not. The same is true of several other stories. The Central American field evidently offers a large group of fascinating problems for the folklore student.

One statement on page 81 should be corrected. In a list of kinship terms which Mr. Thompson implies are native the word tata is given as meaning maternal uncle or paternal uncle. Tata is vulgar Spanish for father and in Northern Mexico at least is applied by persons of the peon class to any man distinctly older than the speaker.

The volume is liberally sprinkled with references to older literature but the comparative work suffers from the lack of similar studies. One of the chief virtues of the paper is perhaps that it emphasizes once more the fact that in spite of three to four hundred years of contact with white civilization the Mexican and Central American Indian still retains elements of his old culture. A comprehensive program of ethnographical work supplemented by an examination of the documentary sources and a check knowledge of Spanish culture of the sixteenth and seventeenth centuries should make it possible eventually to reconstruct a fair picture of the Indian cultures in Spanish North America. Mr. Thompson and the Field Museum are to be congratulated on making a valuable contribution to this difficult problem.

RALPH L. BEALS

Darien in the Past. S. LINNÉ. (Göteborgs Kungl. Vetenskaps och Vitterhets-Samhälles Handlingar, 5 Följden, ser. A, v. 1, no. 3, 1929. 318 pp., 62 figs., I+16 maps.)

Linné here maintains the excellent standard set in his South American Ceramics. He describes the result of archaeological exploration in Panama and the nearer parts of Colombia in 1927 by an expedition led by Nordenskiöld. Both the Atlantic

and Pacific coasts of the Isthmus were examined, as well as the Pearl islands. On the latter, remains of two cultures were found, whose respective age seems reasonably certain, though no stratigraphy was discovered. The earlier culture built round houses, made incised or modeled pottery different from any known from Central America but thought to bear some resemblance to that of the primitive culture of Ancon, and left mounds mainly of shell, including 4 species no longer living in local waters—one of them now only with an Atlantic distribution. The later culture built rectangular houses, left mounds composed largely of sherds, and painted its pottery in a style resembling that of Chiriqui, Costa Rica, and Nicaragua. A mineralogical examination however shows that the ware was made of materials occurring on the islands.

Throughout, the point of view is comparative. The maps well sum up the comparative discussions, and may be listed. They cover North as well as South America. They review the distribution of: 1, pottery made with perforated bottom; 2, pottery grinding pans; 3, 4, flat and cylindrical pattern stamps; 5, stone weapon heads; 6, annular feet (pedestals or bases) on pottery; 7, tripod vessels, with inset showing relative frequency; 8, shellmounds; 9, flat pottery roasting dishes; 10, pottery lids; 11, bevel-edge adzes; 12, pottery mending by "crack lacing"; 13, deep graves; 14, cremation and "endo-cannibalism"; 15, mummification by visceral removal and embalming, fire drying, or simple dessication; 16, pottery incense burners.

The Ecuador coast is pronounced connected with Central America "with all certainty" by water route intercourse.

The Göteborg technique and standard of scholarship are thoroughly upheld in this valuable work.

A. L. KROEBER

'Dobe Walls, A Story of Kit Carson's Southwest. STANLEY VESTAL. (Boston: Houghton Mifflin, 1929. 314 pp. $2.50.)

'Dobe Walls is an excellent novel of its type. This has been recognized by the reviewers of the literary journals, who have recommended it to fiction readers. It is a good story. It is well written and its reads well.

But it is worth the attention of anthropologists for the careful and true characterizations of Plains Indians which the author has made. The Indian characters are delineated with the same clearness and fairness as are the whites. They are treated as if they were human beings: they are not all of them evil villains and none of them are the heroic noble savages of the sentimental "Westerns." Part of the story of the contact of American and Indian in the vicinity of Old Bent's Fort is here presented faithfully and justly.

This achievement is the work of a man who has known the Indians of the southwestern Plains for many years and who published a few years ago a remarkably fine biography of Kit Carson. But not all of us know that Stanley Vestal is Professor Walter Stanley Campbell, who has contributed to the American Anthropologist and is now, while holding a Guggenheim fellowship, writing a life of Sitting Bull.

MAURICE G. SMITH

Die Indianer Nordost-Perus: Grundlegende Forschungen für eine Systematische Kulturkunde. GÜNTER TESSMAN. (Veröffentlichung der Harvey-Bassler Stiftung. Hamburg: Friederichsen, de Gruyter, & Co., 1930. 856 pp., 13 color pls., 95 pls., 6 figs., 42 (+1) maps.)

This is an enormous, original, and remarkable volume. It contributes a mass of new ethnographic data on 49 tribes of the tropical forest of Peru. Most of these facts are brought together in a series of 37 "cartograms" or diagrammatic maps in which ingenious devices have allowed a surprising amount of detail to be expressed. Four further cartograms show the numerical frequency, in each of 33 tribal cultures, of elements assigned respectively to half a dozen culture entities (Kulturgesellschaften): Altkultur, Amazonian with West Amazonian and Ucayali subdivisions, Sub-Andean, Northern. The occurrences of these frequencies are also listed in a series of tables. However, the approach is by no means a mechanically statistical one only. It rests on a philosophy or point of view which the reviewer has difficulty in grasping completely, but which the author hopes will introduce a third period in ethnology, such as Frobenius and Schmidt have only partly anticipated. The Kulturkreise of Schmidt will not hold, but there are genuine associations of culture elements which rest upon the "inward constitution" (bestimmte innere Veranlagung) of the Kulturgesellschaften. In this inner disposition of cultures the most determinative factors are religion and the relations of the sexes. The value of the book, says the author (41), is in its aim, not in its new material on the Indians of northeast Peru.

The reviewer believes the world will think the opposite, at least until the objectives and criteria of the new method are defined more lucidly. The work is a blend of something akin to mysticism with concrete research; of intuition with statistics. Its manner recalls that of the autodidact in its originality, painstaking laboriousness, and unswerving insistence on mannerisms of treatment. Proper names are made over into German or handled freely: the Jívaro become Chiwaro, Quijos Kichos, Betoya Tukano. Some interesting and more or less novel devices of field inquiry are described; and alongside evident insight into native attitudes there is an inkling of pride in treatment of informants reminiscent of that of pre-war Prussian privates by their officer.

Of the cultural groups established, the Northern, consisting of Uitoto, Okaina, Muimane, Bora, is amply validated, by trait-count and otherwise. The Sub-Andean group really comprises only the Jívaro, with 33 elements of 57; next are the "Kandoschi" with 11 of 40. The Amazonian type is centered among the Omagua (59 elements out of 65), in fact looks as if it had been built around the concept of their culture. Next come the Kokama (33 of 42), "Chebero" (30–52), Panobo (27–40), Yameo (27–42), Chama (27–58), Aguano (23–38). These inhabit a continuous territory. The West Amazonian and Ucayali sub-groups center among the "Chebero" (16) and Chama (10 elements), in other words are subtypes superimposed on the general Amazonian type to which they primarily adhere. The Ucayali culture is defined by only 10 traits.

The "Altkultur" is represented among every tribe considered—most strongly among the Auischiri (40 of 51), Mayoruna (49 of 54), and Amahuaca (35 of 48), which are geographically discrete, the first two being separated by the "Amazonian" Omagua and Kokama. This at once raises the critical question whether the author's "old culture" is an empirical reality or a hypothetical complex. Its 47 characterizing elements include a number of positive ones such as couvade, tattooing, wooden signal drum, ear-lobe rolls and lip ornaments for both sexes, sleeping hammock; but more negative ones, such as: *absence* of marriage, adultery, sexual restrictions, menstrual practises, homosexuality, bow, blowgun, tobacco, salt, peanut, dog, weaving, canoe, pottery ornament, stool, spoon, genital dress, musical bow, Pan's pipe, rattle, god, soul, magic. Tessman is right in insisting that absences count as much as presences. But a culture type cannot be built up mainly on lacks, unless these are given a certain empirical entity by discrete and more or less compact geographical occurrence in nature. Pre- and post-Columbian degeneration, unfavorable environment, historical misfortunes, migrations, would all have to be intensively considered as factors.

That there should be tribes with highly mixed cultures, like the "Kandoschi" with 14 "old" elements, 11 Amazonian, 11 Sub-Andean, 4 West Amazonian, is expectable. The fundamental question is whether the assumed culture types are real. Historically arbitrary or nonsensical types would equally well yield pure and mixed tribal cultures. Culture areas as classificatory and interpretative devices undoubtedly have serious limitations. But their geographical reality gives them at least a measure of empirical validity. Tessman's method, though its limited geographical application gives it less extreme appearance, seems fundamentally to rest largely on a priori complexes analogous to those of Graebner, Schmidt, and Smith. In each case the author sets up the pieces and rules of the game with an invitation to the rest of us to continue the game where he leaves off.

What anthropology will be grateful to Tessman for is his mass of new data and their compact, convenient presentation.

A. L. KROEBER

Shabik'eschee Village, a Late Basket Maker Site in the Chaco Canyon, New Mexico. Early Pueblo Ruins in the Piedra District, Southwestern Colorado. FRANK H. H. ROBERTS, JR. (Bulletins 92 and 96, Bureau of American Ethnology, 1929, 1930.)

The two papers under consideration are the first fruits of the intelligently conceived, scientifically prosecuted, and admirably recorded study which Dr. Roberts of the Bureau of Ethnology is making of the early phases of Southwestern archaeology. Each is prefaced by a short statement of our present knowledge of the subject, this portion of the second book being far and away the clearest and most satisfactory summary which has yet appeared. It fulfills perfectly the needs of students in other branches of anthropology who require such a preliminary orientation to enable them to appreciate in terms of the fundamental problems of cultural evolution the significance of the original data presented. The resumé will also

be received gratefully by the constantly growing body of intelligent general readers who would like to follow prehistory beyond the Sunday supplements, but who, in most archaeological contributions, find themselves confused and repelled by strange terminologies, and swamped by details whose bearing they cannot understand.

The first paper, Shabik'eschee Village, records the excavation of a Basket Maker III community on the rim of Chaco canyon, northwestern New Mexico, consisting of 18 one-room dwellings and a kiva. The few burials encountered indicated a dolichocephalic population which did not practice head deformation. The houses were arranged in a crescent opening to the east. A very clear restoration (fig. 2, p. 12) makes plain the salient features of the typical dwelling. It was round or vaguely rectangular, averaged about 13 feet in diameter, and was sunk from a few inches to 2 or 3 feet into the ground. The walls of the excavation were plastered or were reinforced with upright slabs of stone. Four free-standing posts supported a rectangular framework to carry the beams of the flat roof, and also to receive the upper ends of poles which, footed about the periphery of the excavation, slanted upward and inward to form the walls. The exterior of the structure was finished with twigs, bark, and mud. Southeast of most houses was a small, probably conically roofed antechamber, opening by a short passage into the dwelling proper. A section of the floor of the houses about the entrance from the antechamber was often partitioned off by a low wall of upright slabs. In the middle of this a gap was left, opposite which lay a firepit normally protected from drafts by a single deflector slab set on the side opposite the entrance. On the other side of the firepit there was usually a small hole in the floor. In the supposedly flat roof there was a smoke-hole which may also have served as a ladder-reached hatchway.

The structure identified as a kiva lay in the western part of the cluster of dwellings rather than, as would have been predicted, in the semi-enclosed courtyard. It was sunk nearly 4 feet into the ground, was 40 feet in diameter, and was encircled by a low bench. Four posts carried a roof similar to those of the dwellings. In the floor was a firepit, and between this and the southeastern part of the wall a deflector slab argued the former presence of a ventilator or entrance passage.

The data here so briefly summarized are set forth by Dr. Roberts with exceptional lucidity and precision. He supplies plan and section of each structure; minor features of each are described in the same order, thus facilitating comparison; and measurements are sequently grouped. The method of presentation could not, it seems to me, be improved.

The facts once recorded, Dr. Roberts proceeds to interesting interpretations, taking praiseworthy care that the reader shall not fail to distinguish between what is logical deduction and what is speculation. In the latter category are his remarks regarding the possible collateral relationship between the Shabik'eschee dwellings and the surprisingly similar pit-houses of certain Palae-Asiatic peoples. This is obviously a matter of extreme importance, for it bears directly upon basic problems of the population of the New World and of the independence or non-independence of American cultures. Final judgment must rest, as Dr. Roberts points out, upon more detailed studies of house-types, ancient and modern, in both continents.

Should the Asiatic hypothesis prove correct the very pretty theory of the local development of the Basket Maker III house from the Basket Maker II storage cist would fall to the ground, and we should have either to find Basket Maker I and II houses comparable to those of Basket Maker III, or else postulate the introduction into the Southwest of this passage-entered type of pit-house, presumably from the west or northwest, at about the beginning of the Basket Maker III period. Be these things as they may, Dr. Roberts has directed specific attention to fundamental questions.

In his remarks concerning the influence of the Basket Maker III house upon later structures, Dr. Roberts is on much firmer ground. He convincingly confirms the long-held belief that it is ancestral to the Pueblo kiva, by pointing out the subterranean position of both, the resemblance between the old entrance and the kiva ventilator, the common possession of the deflector, the central firepit, the floor-hole or *sipapu*, etc. He argues that domestic ceremonies were connected with various features of the older house and that when natural architectural evolution or innovations brought about by the incoming Pueblos rendered living rooms unfit for such practices, they were transferred to specially built imitations of the former dwellings, thus producing the small family (clan) kiva of Pueblo times. The "great," probably community, kiva of later periods Dr. Roberts derives from the large village kiva of Basket Maker III, one example of which, it will be remembered, was found at Shabik'eschee.

I think there can be no question of the essential correctness of the above suppositions. E. H. Morris, Paul Martin, S. J. Guernsey, and the reviewer, all working independently, have arrived at similar conclusions. Many points of course remain to be made clear; Dr. Roberts, for example, remarks that the Pueblo kiva's roof of cribbed logs has apparently no prototype in earlier structures. But cribbing may have been practiced by Basket Maker III builders in areas not yet explored. What looks, indeed, like a primitive attempt in this direction was found by Mr. Nusbaum in a Basket Maker II cist in the Kanab district of south-central Utah. Identity in construction and in function at all points can hardly be expected; and in the matter of function I feel that Dr. Roberts tends to give too great ceremonial significance to those parts of the old dwelling which doubtless did become ceremonialized at a later time. I can hardly believe that so small a house would have been cluttered up with such features as the southeast compartment or the floor-hole unless they had possessed some practical value, and so I am inclined to be sceptical as to the suggestion that the former was laid off to segregate the women at times of ceremony, or that the Basket Maker III floor-hole, was, in those ancient days, a symbolical entrance to the underworld. But he does not insist upon these identifications and, as in the case of the suggested Asiatic origin of the house, the formulation of hypotheses is, at this stage of the game, all to the good in that it arouses criticism and leads to further research.

The minor antiquities of Shabik'eschee are accurately described and adequately illustrated. The village, unlike many Basket Maker III settlements, was not violently destroyed by fire, and its inhabitants naturally removed most of their be-

longings when they left. Hence a relatively small number of specimens came to light. Artifacts of bone and chipped stone are simple, grooved mauls occur but no axes, the metate is of the grooved type. Pottery is unslipped, culinary wares uncorrugated, the decoration of food-bowls strongly suggests basketry prototypes, an impermanent or fugitive red paint is often found on vessel exteriors. The site being an open one, no perishable objects were recovered, and were it not for the cave explorations of S. J. Guernsey, B. Cummings. and particularly of E. H. Morris, the remarkable achievements of the Late Basket Makers in basketry, sandal weaving, and wood working might well not be suspected. But a report by Guernsey is in press, one by Morris is in preparation, and in the not distant future we shall know Basket Maker III perhaps more intimately than any other single phase of the prehistoric Southwest.

The second paper, Early Pueblo Ruins, is of the same high quality as the first and exhibits, if possible, an increase in assurance of presentation and in ease of style. Of its admirable introduction I have already spoken. The body of the book is devoted to excavations in sites of the Pueblo I period on the Piedra river in southwestern Colorado, a sub-district of the Chaco archaeological province of the San Juan drainage. The Piedra country is peripheral both geographically and environmentally, for it lies on the extreme northeastern edge of the Southwestern field, and its resources both in water and in game are far richer than those of most parts of the Pueblo country. It was apparently not inhabited in Basket Maker III times, its remains running from very early Pueblo I through Pueblo III, with slight traces of temporary occupancy in later periods. As in so many other regions the first villages were small and widely scattered; the later ones larger, fewer, and, from the standpoint of defensibility, more advantageously placed; the latest (in this case the single Chimney Rock settlement) still larger and obviously sited to offer maximum protection against attack.

Dr. Roberts' excavations were confined to Pueblo I ruins, groups of 3 to 15 houses crescentically arranged about large, shallow depressions, each group possessing a refuse-heap cemetery. All these little communities had been destroyed by fire, hence many artifacts were recovered, as well as much clear evidence (in the form of charred beams and hardened adobe imprints,) as to the nature of the structures. The typical house of the oldest phase was a single rectangular room, built in a very shallow, unslabbed depression, with post-supported roof, and walls of poles which slanted slightly inward to the roof-frame, their lower ends being held in place by logs laid horizontally between the roof-posts and the sides of the excavation (a very clear restoration is given in fig. 4, p. 24). The entrance was a lateral doorway. The antechamber, passage, slab compartment, deflector, and *sipapu*, characteristic of the Basket Maker III Shabik'eschee site, were all absent, the only interior fitting being a rather amorphous firepit. The house of slightly later settlements (restoration in fig. 6, p. 37) was in a still shallower pit, and the roof-posts were incorporated in vertical walls formed of poles whose lower ends were simply embedded in the earth. The latest type of Pueblo I house was similar to the foregoing but was entirely above ground and was often accompanied by small two-room structures of crude masonry, apparently for storage.

The circular depressions in front of the little crescentic groups of houses are in origin borrow-pits for adobe used in construction, secondarily reservoirs, and occasionally the site of a kiva. Kivas, however, were not present at all the groups. The best example (restoration fig. 1, p. 44) was semi-subterranean, with a roof comparable to those of the Basket Maker III dwellings of Shabik'eschee. It possessed a ventilator shaft which communicated with the interior at floor level through two small holes, thus obviating the necessity of a draft-deflector between it and the firepit. No *sipapu* could be located, but an inclined passage gave communication with a near-by dwelling.

Burials were found in the rubbish heaps. The majority of the skulls were deformed occipitally, a few were of the undeformed Basket Maker type.

Dr. Roberts describes the architectural features revealed by his excavations with the same precision and clarity as in his earlier report. His method, partly stratigraphic, partly inferential, for ranking his three house-types in chronological sequence, seems thoroughly sound. He explains the paucity of kivas, and the simplicity of those which do occur, as due to the unsettled conditions which apparently resulted in the burning of so many villages. He thinks it possible that former Basket Maker III house-ceremonies may have held over, to so speak, in suspension, until the incoming Pueblo people had become culturally rooted, at which time the old features of construction necessary for the proper performance of such ceremonies were reincorporated in the kivas. In this, however, I believe he fails to take cognizance of the peripheral location of the Piedra country. In Shabik'eschee he argues most convincingly for the derivation of the Pueblo kiva from the Basket Maker III dwelling. But such derivation extending, as Dr. Roberts himself shows, even to details could hardly have taken place after any considerable period of disuse of the prototype, and I think it much more probable that the transition from dwelling to kiva occurred somewhere in the heart of the area, perhaps in the Chaco itself, or in the neighborhood of Johnson Cañon where Morris has found Pueblo I villages more highly developed than they were in the Piedra drainage. If this was the case the Piedra Pueblo I kivas might be considered as derived from the Basket Maker III communal kiva such as was found at Shabik'eschee. The Piedra culture, in spite of improvements in domestic architecture, seems to me distinctly to lag behind that of other Pueblo I groups, and this lag is particularly evident in the pottery.

Ceramically the Piedra ruins are very closely akin to Basket Maker III. Were it not for the presence of deformed skulls and of neck-coiling upon culinary vessels I doubt if anyone would have hesitated to rank the Piedra sites as belonging to the earlier period. Certain improvements are, however, pointed out. Vessel shapes are more exuberant, a true slip appears for the first time, and decoration, which at Shabik'eschee was confined to bowls, is extended to certain small-mouthed containers. In design, too, there are a few elements which resemble those of more westerly types of Pueblo I. But in spite of such advances, the Piedra pottery belongs essentially to the Basket Maker III category. This may mean that the Piedra culture represents a very early transitional phase of Pueblo I which later developed into the

sort of Pueblo I known further west. I think, however, that it may indicate a peripheral persistence in this remote region throughout the time that the main current of Pueblo I growth was going on elsewhere, the influence of the latter drifting back to the Piedra in the form of neck-banding and certain elements of design.

Dr. Roberts' papers are model archaeological reports. Clearly and concisely written, they contain in well-ordered form all the information he was able to derive from the sites; his findings are digested in the light of an intimate acquaintance with the literature and a firm grasp of problems, detailed and general, historic and cultural. And, in some ways most important of all, Dr. Roberts "pays as he goes." Of all Southwestern archaeologists he is the only one whose pen has kept abreast of his shovel; he alone is not overdug. If all of us had followed his admirable practice, the museums would, it is true, have fewer specimens, but we should know infinitely more than we do about what they mean, and many more ruins, in which we are now doing little more than pot-hunting, would be saved for the better equipped students of the future.

A. V. KIDDER

PREHISTORY

La cultura del vaso campaniforme; su origen y extensión en Europa. ALBERTO DEL CASTILLO YURRITA. (Barcelona, 1928.)

The bell beaker, a tulip-shaped funerary vessel, from about six to nine inches tall, ornamented as a rule with incised and pointillé decoration arranged in horizontal bands, is the most important and chronologically valuable of the prehistoric wares from the early metal-using cultures of western and central Europe. The Iberian types and the British Bronze Age beakers so elaborately published by Abercromby have long been admired and recognized as valuable chronological criteria in their respective areas. Since closely related forms could be traced over a much wider region, the problem of the origin and diffusion of the bell beaker has attracted considerable attention, and this distinctive pottery form has in the course of time, suffered a number of putative births and traveled a whole series of hypothetical and mutually exclusive journeys, as from Egypt to the Atlantic (Montelius and Flinders Petrie), southward from a northern homeland accompanying Indo-Germanic hordes (Much), from Moravia to Brittany (Schliz) and from Brittany to Moravia (Schumacher).

The view that the Iberian peninsula was the center in which the bell beaker form and ornament developed and from which it was diffused was first plausibly advocated by Hubert Schmidt in his Zur Vorgeschichte Spaniens (ZE, 238 sq., 1913). It has since been elaborated by Bosch Gimpera (see art. "Glockenbecherkultur" in Ebert's *Reallexikon der Vorgeschichte*) and others of the brilliant Catalan school to which Professor Castillo himself belongs. This volume considers the entire problem of the genesis and diffusion of the beaker on the basis of the stylistic variations which may be traced in the various groups, and the author is to

be congratulated on his extremely clear exposition, in which the relevant data at every point are available within the volume which contains over two hundred plates and two maps. Considering the various beaker-using cultures in a sequence of relatively unitary groups, he traces the evidences and problems of interrelation stage by stage so that his complicated history of diffusion and stylistic variation is nowhere vaguely allusive. The use of a series of diagrammatic figures in which the decorative motives of a series of representative specimens from each area may be readily compared, contributes considerably to the value of the work, for the elaboration and fusion of a variety of decorative styles is to be traced in the history of this ware as it passed from one region to another.

The earlier part of the volume is devoted to the development and expansion of the bell beaker in Iberia. Castillo has already in *La ceramica incisa* elaborated the view of his school that this ware developed in the Guadalquivir valley from the incised wares of the allegedly pre-megalithic cave culture of the Iberian plateau. This theory appears debatable in view of the uncertain chronology of the cave finds, the appearance of beaker sherds at Gerundia, an early Almerian site, and the wealth and variety in both form and ornament to be observed in the material from the central Portuguese megaliths and rock cut tombs. Although the bell beaker in its developed Iberian form is no Egyptian or East Mediterranean ware, is indeed an essentially individual and autochthonous product, it nevertheless remains entirely possible that external factors and ceramic traditions played a considerable part in the establishment of the bell beaker style. This problem has recently been discussed in this journal (32:32 sq., 1930).

The diffusion of the bell beaker through the Iberian peninsula is considered in detail and the earlier classification of Bosch Gimpera is elaborated into nine bell beaker provinces. The dominant criteria are appropriately stylistic, and the uncertainties are clearly indicated by the author. The interconnection between southern Portugal, the Guadalquivir valley, and Almeria is clearly indicated. From the Guadalquivir northwards into the middle Tagus region, and from Almeria up the west coast into Catalonia, where the influence of plateau styles is also to be observed, definite movements can be traced. The far northern beakers of the eastern Pyrenees, the Basque country, and Galicia are believed to derive mainly from the Almerian. Leeds' view of reflex movement from southern France is not considered, but the possibility of Portuguese influence in Galicia is not excluded. This expansion in Iberia coincides with the development of the first metal-using cultures in western Europe and it is to this association with the exploitation and trading of copper that Castillo attributes the vigorous dissemination of the bell beaker.

From Iberia, and especially Portugal, the bell beaker was carried up the Atlantic margin in the rich megalithic culture of Brittany. Curiously enough, the numerous beakers in the related megalithic tombs of the Channel islands are ignored. This is an unfortunate omission, for while the bell beaker has failed to appear in the megalithic tombs of the British Isles, some of those usually considered as of Bronze Age date and Rhineland parentage may yet have to be derived from Brittany (cf. Childe, The Danube in Prehistory, 201, note 1) and the sherds from

Moytirra (Sligo, Ireland) which Castillo discusses with appropriate hesitancy, are undoubtedly Ibero-Breton rather than Britano-Rhenish in type.

In the megalithic cultures of southern France the bell beaker is found in the tombs of the earliest period. Castillo follows Bosch Gimpera in assuming a direct trans-Pyrenean relation with Iberia for both the megaliths and the beakers, but it is difficult to discount entirely the indications of Sardinian and Balearic influence in this area, and the beaker itself was undoubtedly carried eastwards into the western Mediterranean from Iberia. Indeed, it is the appearance of the bell beaker in the Villafrati culture of Sicily, datable to the second half of the third millennium which affords the first direct evidence of its chronological position.

The bell beakers of the middle Rhine constitute an interesting problem. Some are obviously in the Iberian style and to be derived most easily from southern France; in others the horizontal bands are decorated in panels (metopes) in the central European style; while still others, tall, angular, and relatively clumsy, show marked influence of the continental corded ware including plastic and cord impressed ornament. Their cultural context remains somewhat obscure, but "bracers" and copper daggers are typically associated with them and their makers appear to have merged with or succeeded the Michelsberg people who occupied hill forts in this region. Åberg, Bosch Gimpera, Schumacher, and others had regarded the Rhenish beakers as forerunners of the central European types and conceived of a movement eastwards from the Rhine. But since, as Childe has independently recognized (The Danube in Prehistory, 196), there are strong reasons both of style and of association for deriving the south German and Bohemian beakers from the Sardinian and North Italian, Castillo regards the Brenner route from north Italy, already suggested by Åberg and Childe, as dominant for all the central European groups.

In relation, then, to the central European groups the Rhenish appears to have received rather than contributed. The Saxo-Thuringian group, it is claimed, forms a stylistic unit derived from the southeast. It therefore follows that the mixed styles of the Rhenish beakers are to be explained by the meeting of eastern and southwestern beaker folk whereby beakers of Franco-Iberian type come into juxtaposition with those of Bohemian and Saxo-Thuringian style and also others, generally known as zoned beakers, which have been profoundly influenced by the continental corded ware.

The Rhenish beakers extending down into the Netherlands were themselves, as Abercromby demonstrated (A Study of the Bronze Age Pottery of Great Britain and Ireland, 1912), the ancestors of the forms introduced into England at a variety of points and associated with the beginnings of the British Bronze Age.

The history of the bell beaker therefore, as elucidated by Castillo, included a bifurcating diffusion from its origin center, the Iberian peninsula, and a later convergence of the two streams on the Rhine. Although he speaks throughout of the "cultura campaniforme" and shows the wide association of bracers and copper daggers (precise parallels to the broad flanged tang Ciempozuelos type can be

adduced in Bohemia) he does not pay any great attention to the wider cultural problems such as the early relation of the beaker to the megalithic tomb and the significance of their later divorce. If, moreover, as he very pertinently suggests, the wide diffusion of the bell beaker is associated with the development of an early traffic in copper there is little reason to expect that movements were entirely canalized into large streams and the problem of alternative routes may be over emphasized. The dual movement traced by Castillo is doubtless but a composite of a number of individually varying routes and connections, for as Childe has recently pointed out

> The diffusion of bell beakers is due neither to a mass immigration nor to mere cultural borrowing. It results from the movements of small groups of people quite evidently guided by a taste for gold, amber, copper and kindred substances. Their acquisitiveness was partly satisfied by "trade." If some of them settled down in Moravia or the Rhineland, that does not mean a total fixation. On the contrary they would have moved to and fro along the routes they had discovered and along others they were exploring. We must compare their activities to Arab traders in Africa rather than to the migrations of the Bantu (*op. cit.*, 196).

There is a French translation of the last chapter in which Castillo sums up his conclusions. The Spanish text is extremely lucid throughout.

C. DARYLL FORDE

Le Finistère préhistorique. BENARD LE PONTOIS. (Publications de l'Institut International d'Anthropologie, no. 3, 1929.)

This large volume, the third of a series of archaeological publications of the Institut International d'Anthropologie,[1] discusses the antiquities of Finistère. The term antiquities is used advisedly, for of systematic archaeology there is very little.

The author, the honorary curator of the Musée de Penmarc'h in Southern Finistère, has gathered in this volume the results of his excursions among the megalithic and later tombs of the region. He is interested in hypotheses of astronomical alignment of megalithic structures and in their relation to tide levels, but has added little to the work of Du Chatellier whose Les Époques Préhistoriques et Gauloises dans le Finistère (1907) remains the best connected account of the west Breton material and is the basis of this volume.

One is, however, grateful for the description of the St. Urnel necropolis, used from megalithic until Gaulish (late Iron Age) times; and for several plans of important tombs, hitherto entirely or in part unpublished, such as the Kernic gallery (fig. 169) which has relations with eastern and northeastern Breton forms, the Rosmeur tumulus (fig. 243) the construction of whose main chamber, however, still remains obscure, and of numerous Bronze Age dry-walled cists (figs. 228–232) whose sites are, unfortunately, not always given. The continuation of the menhir tradition into Bronze and Iron Age times is discussed and abundantly illustrated. The large distribution map is very clear and considerably more complete at certain points than those of Du Chatellier.

[1] Cf. AMERICAN ANTHROPOLOGIST, 31:155, 1929.

M. le Pontois does not confine himself to Finistère, however, but would consider the cultural relations implied in his material. Unfortunately, apart from a general scheme based on Déchelette, his main authorities appear to be Bertrand (whose inaccurate, misleading and, we thought forgotten, map of megalithic distributions in France is resuscitated in fig. 53) and Siret in his more pan-Phoenician moments. The work of Bosch Gimpera, Serra Rafols, and Poisson, to mention only that recently available in French, is ignored. A great deal of irrelevant material reminiscent of the personal descriptions and reflections of the nineteenth century collectors is included in the volume. There is little attempt to discuss seriously the distributional problems of megalithic types and the relation of the Finistère cultures to those of Morbihan in the megalithic and full Bronze Age periods.

The text is illustrated with a very large number of small photographic reproductions of monuments and cases of implements, but the quality of both the photographs and the reproductions is in general so inferior that one would willingly have sacrificed the majority of the illustrations for a few good half-tone or line drawings on a useful scale. The reproduction of implements is particularly defective. They have in general been mounted in large groups on cards which form a dark and obscuring background. An individual specimen may be even less than a centimeter in length on the plate (figs. 24, 34, 37) and the figures are often so blurred as to be completely worthless (cf. figs. 32, 38, 205).

It is regrettable that the labor and expense which went into the preparation of this volume could not have been directed to a more systematic comparative study of this important area, or that it was not avoided by the publication of a brief pamphlet embodying the objective results of M. Pontois and his colleagues. It is strange that the late Dr. Capitan could yet write of it in the preface:

> Rien de plus difficile, mais aussi de plus agréable, que de presenter unlivre et son auteur, surtout, quand le livre est plein d'idées neuves et de faits inedits, comme celui-ci, moderne dans ses méthodes, précis dans sa documentation surabondante, basé sur des faits rigoureusement exactes.

C. Daryll Forde

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DISCUSSION AND CORRESPONDENCE

Tobacco in New Guinea

In his recent paper[1] in the American Anthropologist on the above subject Dr. E. D. Merrill brings forward some welcome new facts relative to tobacco from New Guinea, especially regarding that raised from seed by Dr. T. H. Goodspeed. The distribution of native-grown tobacco in New Guinea and some neighboring islands, as found by modern explorers, is peculiar and difficult to explain provided all this tobacco owes its origin to America. This has led a number of persons to suggest that there might be some species indigenous to this area from which the native tobacco could have been derived. Some writers are even more emphatic. Krieger[2] says: "Tabak ist ohne Zweifel eine auf Neu-Guinea einheimische Pflanze." Few, however, went further than to suggest the possibility or probability of an indigenous species. Sir William McGregor, the most noted of New Guinea governors, regarded this as probable. Mr. C. A. W. Mockton, speaking of finding tobacco plants on the summit of the Wharton Chain, over 9,000 feet high, says:[3]

> Here, tobacco plants were in evidence, remarkable for the length and fineness of the leaves and peculiar fragrance; but whether indigenous or grown from seed dropped by natives I do not know—I incline to the former view.

All these were mere opinions, however, held as more or less probable from the evidence at hand, but recognizing that only the botanists could decide the problem. The general facts, so far as known, regarding the cultivating and use of tobacco by the natives, were brought out in my previous paper.[4] It did not seem unreasonable, in view of these facts, to make the final statement that they "seem to point to an ancient use of an indigenous New Guinea species of tobacco probably closely related to the Australian species," particularly as native species have been reported from neighboring regions. Engler and Prantl,[5] for example, under Nicotiana, list, among others, the following species: "3 Arten auf den Sundainseln, 1 Art (*N. suaveolens* Lindt.) in Australien, einige endemische Arten auf den Inseln des Stillen Oceans, z. B., *N. fragrans* Hook, auf den Norfolkinseln." Even if the others are now discredited, the validity of a separate Australian species is still recognized.

Dr. Merrill begins his paper as follows:

> The myth that is more or less prevalent among some ethnologists, but not among botanists, to the effect that tobacco was known to and used by the natives of New Guinea previous to the arrival of Europeans in Malaysia, apparently originated with Dr. O. Finsch.

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[1] E. D. Merrill, Tobacco in New Guinea. AA, 32: 101–105, 1930.

[2] Maximilian Krieger, Neu-Guinea (Berlin), p. 215, 1899.

[3] C. A. W. Monckton, Last Days in New Guinea (London and New York), p. 46, 1922.

[4] A. B. Lewis, Use of Tobacco in New Guinea and Neighboring Regions. Field Museum, Anthropology Leaflet 17, 1924.

[5] Engler and Prantl, Die natürlichen Pflanzenfamilien. IV, 3 b, p. 32.

In support of this supposition he quotes a long passage relating to tobacco and tobacco-pipes from Dr. Finsch, and lays especial emphasis on the following sentence:

Die Tabakspflanze ist ohne Zweifel auch an dieser Küste Neu-Guineas eigenthümlich, und ihre Cultur wurde längst vor Ankunft der Europäer in der Weise betrieben, wie ich dies noch bei den Koiäri im Innern und anderwärts an der Küste sah.

Commenting on this he says:

Doctor Finsch's direct statement regarding tobacco in New Guinea previous to the arrival of the Europeans appears to me to be merely an expression of personal opinion, and is not supported by any corroborative evidence (p. 10).

It appears to me that Dr. Merrill has misinterpreted Dr. Finsch's meaning, and has taken a part for the whole. Dr. Finsch definitely says "an dieser Küste Neu-Guineas," and the quotation is taken from that section of Dr. Finsch's paper[6] dealing solely with the southeast coast of British New Guinea. With this limitation, set by Dr. Finsch himself, corroborative evidence comes from practically every explorer in that territory.

This, of course, refers to its use in modern times, which even Dr. Merrill admits. The real problem, also stated by Dr. Merrill, is whether American tobacco could have come into New Guinea in early times by way of the Moluccas through Malay (or Chinese?) traders. There was considerable intercourse between the Moluccas and western New Guinea, especially the northwestern part. The sultans of Tidore claimed much of western New Guinea as part of their domain, which claim was passed on to the Dutch when they took over the Tidoran territories. That tobacco was introduced into New Guinea in some such way as this, and then spread over most of the island through native dissemination, has been so generally assumed, even by ethnologists, that I neglected, I am now sorry to confess, to mention it in my paper in connection with the other hypothesis. For example, Dr. H. A. Lorentz,[7] in his book on the Dutch Expedition to the "Snowmountains" in 1909, says, in speaking of the tobacco raised by the Pesegem of the interior mountains,

Aanraking moet er dus plaats hebben gehad, hetzij met noordkust, hetzij met zuidkust bewoners, daar de tabaksplant op Nieuw-Guinea geen inheemsche plant is.

Mr. Lorentz may have evidence for this positive statement, but he does not mention it, so far as I have been able to discover.

That Dr. Finsch was the originator of the "myth" which Dr. Merrill has discovered certainly never occurred to me. I would rather suppose the contrary from the following statement:[8]

Die früher von mir von der Südküste mitgebrachten Herbarproben zeigten die Identität der von den Papuas kultivierten Pflanze mit dem gewöhnlichen Bauerntabak (*Nicotiana tabaccum*), mit dem sie in Aussehen wie Blüte durchaus übereinstimmt.

[6] Ethnologische Erfahrungen und Belegstücke aus der Südsee, Zweite Abtheilung; Neu-Guinea. I, English-Neu-Guinea, a. Südostküste. Annalen des k.k. naturhistorischen Hofmuseums, Bd. 3, Heft 4, 327, 1888.

[7] H. A. Lorentz, Zwarte Menschen-Witte Bergen (Leiden), p. 39, 1913.

[8] Otto Finsch, Samoafahrten (Leipzig), p. 58, 1888.

The aim of my paper was to gather together, so far as I could, the facts relating to the use of tobacco. The whole paper is concerned in describing these facts, with the exception of the last sentence and parts of two others. That they are not documented is due to the popular character of the series in which the paper appears. The "general purport" of the paper was not to support any theory, but purely descriptive. Only in the last sentence did I venture a theoretical proposition, that "the facts seem to point," etc. This, to Dr. Merrill, "does not seem to be warranted" yet he himself is kind enough to say:

> The arguments [!] appear at first glance to be *rather conclusive* [italics mine] except that apparently the author is theorizing with almost no botanical evidence to support his conclusions.

Apparently the facts *argue* for that particular conclusion!

As to botanical evidence I hunted high and low for it with small results, even in New Guinea, where I was unable to find a single growing plant, and the few packages of native trade tobacco which I did obtain were unfortunately discovered by some of my boys before I could get them safely packed away, and went up in smoke. Later a few leaves were discovered in a bamboo tube, and through Dr. Laufer submitted to Dr. C. F. Millspaugh, at that time Curator of Botany in Field Museum, who reported on them as follows:

> It is not possible to determine the species of the Nicotianae from the leaves alone. The distinctive characters lie in the calyx and the corolla, and especially the seed. However, I judge that the species you submit from Guinea is *Nicotiana suaveolens* of Lehmann Generis Nicotianarum Historia, Pars Botanica (Hamburgh), 1818, p. 43; n. 18. My opinion that the species is *N. suaveolens* is based mostly on the fact that that is the prevailing species cultivated in Africa (south) and on the islands adjacent. The leaf characters of the specimen submitted are those of the species so far as their characters in the specimen reveal.

Against this there was the statement of Dr. Finsch as quoted above; but on the other hand there was that of Mr. Maiden[9] referred to in my paper (p. 8) in which he says:

> The presence of a longish petiole at once excludes this tobacco from *N. tabacum*, and of all the species described by Asa Gray it certainly comes nearest to *N. rustica*. It is not very remote (I speak of the foliage alone) from our *N. suaveolens*.

So Finsch reports it as one species, and Millspaugh and Maiden say it is not that but resembles *N. suaveolens*. Even if Dr. Merrill does not believe in these statements, still they come from botanists, so the hypothesis is not without some botanical support.

The Dutch expeditions of recent years have apparently found what they regard as *N. tabacum* in the Dutch territory. Dr. Wichmann reports[10] finding this on Lake Sentani, and Dr. Lorentz implies it in his statement quoted above. This did not seem to me conclusive evidence for the whole of New Guinea, however.

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[9] Proceedings of the Linnean Society of New South Wales, ser. 2, 2: 463, 1887.

[10] Arthur Wichmann, Nova Guinea, vol. 4, Bericht über eine im Jahre 1903 ausgeführte Reise nach Neu-Guinea (Leiden), p. 187, 1917.

In addition to my final sentence, Dr. Merrill quotes (p. 102) two other sentences with evident disapproval. One is merely the statement of a native tradition, and is a fact to be considered, whatever weight be ascribed to it. The other relates to Australia and is as follows:

> The natives . . . . utilized their own tobacco long before the trader's tobacco became known to them.

The native use of *N. suaveolens* is described in my paper (p. 8), but as it is questioned by Dr. Merrill, I shall give here a few references and quotations. In the reports of the Scientific Results of the Elder Exploring Expedition, the naturalist, Mr. Richard Helms, says,[11]

> To find that the natives of the Everard Range and Blyth Range tribes use tobacco was a surprise to me. . . . . Whilst these tribes have discovered the stimulating properties of *Nicotiana suaveolens*, they do not seem to know the more powerful narcotic of "pituri," *Duboisia Hopwoodii*.

The same use of native tobacco by the aborigines of this region is reported by Mr. S. A. White in Scientific Notes on an Expedition into the Northwestern Regions of South Australia.[12]

On its use in Central Australia Dr. E. C. Stirling, under "Plants used for Other Purposes than for Food" writes as follows:[13]

> NICOTIANA SUAVEOLENS. "Native tobacco." For human use the place of "Pitchuri" is taken by the above named plant. Growing freely in many places the chewing of its leaves and stems is a general practice amongst both the Arunta and Luritcha tribes. Though in several instances I saw portions of the dried plant used in their natural condition, the proper method of preparation, for which I am partly indebted to Mr. Gillen, is as follows: The variety preferred is that growing on the tops of stony ranges; of this the leaves and stems are dried in the sun. These are then ground into powder, which is mixed with an equal quantity of the white ash of the leaves and fine twigs of *Cassia eremophila* if available, if not, of those parts of some other bush, and the mass is made into a bolus of suitable size with saliva. This is chewed and passed from mouth to mouth, a bolus lasting about twenty-four hours. When not in use it is carried behind the ear or in the head or arm band. The lubras are allowed to chew the plant only in the natural state. Mr. Gillen informs me that the plant is used as a trade article as far north as Tennant's Creek.

The use of both native tobacco and pitchuri is described with considerable detail by Dr. Eylmann.[14] According to him, the geographical distribution of *N. suaveolens* is much more limited than that of *Duboisia*. Its use is therefore restricted.

> Der native tobacco findet hauptsächlich dort Verwendung, wo er wächst, doch gelangt er als Tauschware auch zu nördlichen und südlicher wohnenden Stämmen.

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[11] Transactions of the Royal Society of South Australia, 16: 248, 1892–1896.

[12] Transactions of the Royal Society of South Australia, 39: 727, 1915.

[13] Report on the Work of the Horn Scientific Expedition to Central Australia. Anthropology, 4: 61–62, 1896 (edited by Baldwin Spencer).

[14] Erhard Eylmann, Die Eingeborenen der Kolonie Südaustralien (Berlin), 305–307, 1904.

The method of using the two plants is the same. Speaking of pitchuri, he says,

Die Zubereitung der Prieme gleicht ganz der aus Tabak: zunächst erwärmt man die zerkauten Blätter und vermengt sie dann mit Akazienasche.

Although Dr. Hartwich[15] regards the New Guinea tobacco as of American origin, of Australia he says:

Australien muss uns dabei von grösstem Interesse sein, weil es derjenige Erdteil ist, in welchem die Menschen vor Aukunft der Europäer zweifellos Tabak benutzten und zwar einheimischen, der also nicht auf irgendeine Weise von America gekommen war.

And yet Dr. Merrill, apparently basing his statement solely on an opinion of Professor A. R. Radcliffe Brown, says categorically that "the aborigines in Australia made no use of the Australian native *Nicotiana*," and he uses this "fact," as he calls it, to help prove how highly improbable a local discovery of smoking in New Guinea would be!

The somewhat polemic character of the discussion so far is because it seems to me that Dr. Merrill has not correctly represented either my own paper or the problem as a whole. Any new evidence is welcomed by no one more than by myself. The question is not yet decided, however. There are too many unknown regions and unidentified tobacco plants in New Guinea, New Britain, and Bougainville, and the difficulties of cultural diffusion too great, to admit of guesswork. It is the calm assumption by nearly every one, including the ethnologists, that all cultivated tobacco must have come from America, that prevents the acquiring of real evidence. Dr. Merrill's paper is an illustration of this.

If the cultivation and use of tobacco does owe its origin to America, its spread, as shown in New Guinea and the other islands, is a remarkable case of cultural diffusion, and more interesting and important to the ethnologist than the other supposition. If one cultural element can pass independently from tribe to tribe, from culture area to culture area, through or over sharp cultural boundaries,and across many almost isolated regions, and all in two or three hundred years, what mixtures may not have arisen in the past centuries, and why worry about the migration of peoples when cultural elements are so independently migratory?

ALBERT B. LEWIS

TOBACCO IN NEW GUINEA: AN EPILOGUE

As Dr. Lewis' contribution to the use of tobacco in New Guinea is one of six leaflets prepared by various members of the Museum staff under my direction and edited by me in the Field Museum series of Anthropology Leaflets (15–19 and 29), I may be allowed to add a few remarks to my colleague's rejoinder to Dr. Merrill. No one who has read these six leaflets will accuse me or even suspect me of being an anti-American heretic, for I have strictly upheld and, I venture to hope, have also proved the introduction of both *Nicotiana tabacum* and *N. rustica* from America into Asia, Europe, and Africa. In regard to Melanesia and Australia, however, I

[15] C. Hartwich, Die menschlichen Genussmittel (Leipzig), p. 117, 1911.

believe the situation is somewhat different, and this despite Dr. Merrill's criticism, which is not convincing to me. Dr. Merrill is well known as an eminent botanist from whose writings I have learned a great deal, especially with reference to the cultivated plants of the Philippines, a subject in which he is an undisputed authority. The "ethnological myth" invented by Dr. Merrill has been refuted above by Lewis. The botanical data of Engler-Prantl to which he refers, combined with a statement of A. de Candolle (Origin of Cultivated Plants, p. 142), who records two native species, *Nicotiana suaveolens* for New Holland and *N. fragrans* for the Isle of Pines near New Caledonia and who states that these two are foreign to America, were sufficient botanical evidence to an ethnologist for assuming a native *Nicotiana* species in Melanesia and Australia.

Dr. Merrill states from hearsay that *N. tabacum* occurs in New Guinea. I should be the last to doubt it; its non-occurrence there would be next to a miracle. This fact, however, does not disprove that a native species might not occur there. Dr. Merrill's informants have assuredly not explored the entire length and breadth of New Guinea.

Tobacco was known in New Guinea at least in the beginning of the seventeenth century, for it is mentioned by Jacob Le Maire, who sailed along the coasts of the island in the year 1616 (Australian Navigations, ed. by De Villiers, pp. 223, 226). On the 23rd of July of that year Le Maire, when he was a short distance from the land, reports that he was followed by six big canoes of natives bringing dried fish, coconuts, bananas, tobacco, and small fruit-like plums. The date in question is rather early and almost coincides with the first introduction of the tobacco plant or plants into Japan, China, Java, India, and Persia. Le Maire's notice, of course, is inconclusive as to whether the tobacco to which he alludes was imported or indigenous. Dr. Merrill's supposition that tobacco was introduced into New Guinea from Amboina is purely subjective and does not constitute historical evidence. I have written a very detailed history of the American cultivated plants in their distribution over the Old World mainly for the purpose of doing away with all the wild guesswork and speculation from which this subject has hitherto suffered, and replacing it with facts based upon documentary evidence; it will be seen that many of the guesses made, especially with reference to Spanish and Portuguese agency, are wrong and that the transmission of American plants was frequently effected through quite different channels.

The worst of Dr. Merrill's guesses is his suggestion that "the type of pipe and method of smoking tobacco in New Guinea is merely an adaptation of the pipe and opium smoking." In the first place, there is not a ghost of resemblance or affinity between the New Guinea method of tobacco smoking and opium smoking. In the second place, this alleged interaction is historically impossible, for opium smoking sprang up as a sequel of tobacco smoking only in the beginning of the eighteenth century, when the opium-pipe was first invented by Chinese in Formosa (see our Leaflet 18, pp. 23–24). In other words, opium-pipe and opium smoking are rather recent events, hardly two hundred years old, while the peculiar method of smoking tobacco in New Guinea from tubes in which the smoke is stored must be

many centuries old. This method does not occur anywhere in America, Asia, Africa, or Europe; it is unique and peculiar to and characteristic of New Guinea, and must therefore have originated in New Guinea.

Chinese contacts with New Guinea are not of ancient date, as supposed by Dr. Merrill. New Guinea is not even mentioned in any Chinese records, nor do early Chinese contacts in the Philippines, as Dr. Merrill boldly asserts, antedate or at least approximate the beginnings of the Christian era. Chinese trade with a few of the Philippine islands was established from the tenth to the thirteenth century, but closer relations and foundations of Chinese trading posts in the islands are not earlier than the end of the fourteenth and the fifteenth century.

BERTHOLD LAUFER

RECENT DISCOVERIES OF FOSSIL HUMAN REMAINS

Through the courtesy of Mr. Henry Field, we are able to publish the following note, quoted from a letter written by Professor Wilhelm Freudenberg regarding his recent discoveries near Heidelberg.

"I may tell you that Professor Boule in Paris suggested that part of my fossils from Bammenthal belong to *Homo heidelbergensis*, while the other fossils, which I named *Hemianthropus osborni*, suggested to him some resemblances to *Homo sapiens* and not to the anthropoids. The jugal bone resembles cynocephalid forms in the direction of the squamose processes, while the cheek part is truly human but very convex. This may be a transitional form in some respects, like *Eoanthropus dawsoni*, which is also suggested by the very short diaphysis of the femur, which resembles that of a chimpanzee. A new genus occurs with *Elephas trogontheri*, the steppe elephant. *Homo heidelbergensis*, however, is found with *Elephas antiquus*, the woodland elephant. The former may, on the other hand, be a relation to *Pithecanthropus* and *Sinanthropus*, which is proved apparently by the very large brain case, of which a fragment has been found, together with an isolated part of the orbits, which are very large and round, and in this respect similar to the African anthropoids. The jugal bone combined with the orbits is of a different type compared to that of *Hemianthropus*.

"While with Professor Sir Arthur Keith, F. R. S., it was stated in the Royal College of Surgeons that the gorilla is not present at Bammenthal or Mauer, as the cancellae on the side part of the supraorbital ridge are present in the fossil *Homo heidelbergensis* or related form but not in the gorilla. They are present in *Sinanthropus*, as I saw in photographs sent to Professor G. Elliot Smith of London by Professor Davidson Black of Peking. This information throws a new light on the earliest history of mankind."

ANTHROPOLOGICAL NOTES AND NEWS

Codex Vindobonensis Mexic. I.

When Walter Lehmann undertook the grouping of the Mexican hieroglyphic manuscripts, in particular of those of the Mixteko-Zapotekic group, in the Journal de la Société des Américanistes de Paris (pp. 421 ff.) in 1905, putting the Codex Vindobonensis Mexic. I at the head of group II, "Les peintures Zapotèques," next to its nearest kindred, the Codex Nuttall at the British Museum, he did not fail to add the wish which often had been repeated before and after him: "Espérons, qu'une reproduction comparable à celle que nous devons à la générosité du duc de Loubat, rendra bientôt accessible au public intéressé ce précieux document!"

The authorities of the former Imperial Library at Vienna had indeed intended to reproduce at last in facsimiles this codex, which had been appreciated by them as well as by all scholars as a special cimelium in the series of cimeliums of the "Monumenta Palaeographica Vindobonensia," opened in 1910. This plan was, however, rather put back by the hard war and postwar times. But already in 1925, the art-establishment of Max Jaffé at Vienna undertook, in conjunction with the authorities of the National Library, to publish perfectly faithful facsimiles of the Codex Vindobonensis, without any support on the part of a Maecenas on so great a scale, as the Duke of Loubat was, and in spite of the bad conditions which were much more unfavorable than those of pre-war times. They did it with the intention of making the acquaintance with one of the most important monuments of Ancient Mexican culture possible to all students of this province, and of thus giving important support to the difficult task of deciphering these rare remnants of the culture of the American Middle-Ages, or, to be more exact, Antiquity—last not least in the expectation of finding due understanding for their enterprise in the circles interested in it.

The Codex Vindobonensis is given a particular charm by its marvellous adventures, which, in themselves, prove the high degree of appreciation it met with through all the periods of its existence. Brought to Europe in 1519 as a gift to the Emperor Charles V from Cortez, the manuscript passed through the collections of famous princes and well known bibliophiles, finding at last a permanent home and extraordinary appreciation in the Imperial Library in the seventies of the 17th century.

Seler thought its home to have been in the country of the Totonaks, a question still waiting for conclusive examination and strict delimitation In spite of the peculiarities it owns, which are characteristic of all similar manuscripts of this group, it also shows some more or less loose relations to the Mixteko-Zapotekic hieroglyphs, to the Seldenmanuscripts of the Bodleian Library at Oxford, to the manuscripts of the Cuicatekic group (according to Lehmann) represented by the codices "Porfirio Diaz" and "Fernandez Leal"; even the manuscripts of the Codex Borgia group may be brought in connexion with it, although they differ

in certain respects, when compared to the group of the Codex Vindobonensis with its complicated astronomic balancing-accounts and other peculiarities of this kind.

The analysis of all the single elements of these connexions, the yet unsolved problem concerning the contents of the Codex Vindobonensis Mexic. I, which, according to the examinations made up to the present, has to pass for a merely astronomical one, and the commentation upon the manuscript, as well as the tables which are intended to facilitate the deciphering, are offered in concise form by Walter Lehmann's preface.

Archaeological Survey of Eastern Colorado

Under the auspices of the Smithsonian Institution of Washington, the University of Denver, and the Colorado Museum of Natural History, the first archaeological survey of Eastern Colorado was undertaken last summer. The staff comprised: Dr. E. B Renaud, Professor of Anthropology, as Director, Paul Beaubien, as chief assistant, Dale King, Rex Long, and Charles Steen, as field assistants (all graduates, excepting the latter, a senior, in anthropology from the University of Denver). The whole staff was actively engaged in field work from June 6 to August 15th, or ten weeks, and since then the Director has taken several trips to finish up the work. The territory covered extends from the Rockies in the west to the Kansas line in the east and from Nebraska and Wyoming in the north to the Oklahoma and New Mexico borders in the south, thus connecting with the work done last summer by Dr. Renaud in the Cimarron valley. The expedition covered over 10000 miles, recorded more than 250 Indian sites, and collected about 1000 pounds of flaked stone artifacts without counting bulkier metates, manos, and pounders. This material will be studied during the fall and winter months and a report of the results of this survey will be published later by the University of Denver, together with an archaeological map of Eastern Colorado. A study will be made of the types of artifacts and of their distribution as well as of the materials employed in their making. Thus it appears already that petrified wood from the Black Forest was mostly used in the central highlands of the region, quartzite of a variety of colors in two centers of frequency, one the S.E. corner of Colorado, near Oklahoma, and the other in the N.W. districts near Wyoming, while flint was more common in the north and a black, slaty material was generally employed in most of the S.W. portion of the area. A special chapter will be devoted to the pictographs seen on the boulders and cliffs of the southern canyons and western foothills.

This survey is, by necessity, somewhat sketchy, as the territory to be visited was enormous for such a small staff and a short time. However, it may contribute some valuable knowledge as it is pioneer work in that field. The archaeological survey of Eastern Colorado will connect on the one hand with other surveys undertaken from Nebraska eastward and on the other hand with those of New Mexico and Arizona in the Southwest, and this may add to its significance and usefulness.

Identification of Botanical Material from Excavations

The National Research Council Committee on State Archaeological Surveys has arranged with the Museum of Anthropology at the University of Michigan for the establishment of a clearing house and identification center for botanical specimens discovered in the course of archaeological excavations. This service has been made possible through the cooperation of Dr. Melvin R. Gilmore, a specialist in ethno-botany, who is Curator of the Division of Ethnology.

If you have any such specimens, please send them, together with the necessary data, to Dr. Gilmore, who will be glad to identify them as completely as possible for you. We hope that if there are duplicate specimens, Dr. Gilmore may be permitted to keep one or more of them for his files. Of course no publication rights are involved.

Sincerely yours,
Carl E. Guthe
Chairman

Mandan Earth Lodge to be Reproduced

The State Historical Society of North Dakota, with the cooperation of the state authorities, has started work on a reproduction of a Mandan earth lodge in the state capitol grounds at Bismarck. According to the North Dakota Historical Quarterly for April it will be about 45 feet in diameter and built according to the description and pictures of early travelers in the northwest, with Indians from the Fort Berthold reservation superintending the work.

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The McDonald-Warren Foundation expedition, headed by George R. Fox, has unearthed the skeleton of an Indian chief of 500 to 1000 years ago, along with bear-tooth and shell necklaces, and arrowheads. The find was made on La Cloche island, Georgian bay, Ontario. The material will go to the Edward K. Warren Foundation at Three Oaks, Michigan.

An Expedition led by Charles L. Bernheimer in 1930 uncovered mummies, skeletons, tools, and implements of the Basket-Maker culture in Arizona. The outstanding find was a boomerang closely resembling the boomerangs of Australia. Mr. Bernheimer represented the American Museum of Natural History, the Smithsonian Institution, and the Carnegie Institute.

Evidences of iron smelting have been discovered in strata of the "palaeolithic" age in a cavern at Mumbwa, Northern Rhodesia, by an Italian expedition.

FRANK SETZLER has joined the staff of the U. S. National Museum as assistant curator of American archaeology. Mr. Setzler is a graduate of the University of Chicago. He has been associated with the field explorations of the Ohio State Museum and was for three years in charge of the Indiana archaeological survey.

NEIL M. JUDD has been put in charge of the new division of archaeology of the U. S. National Museum, as curator. The new division is made up of the former divisions of American archaeology and Old World archaeology.

THE UNIVERSITY OF PENNSYLVANIA Museum and the American School of Oriental Research at Bagdad are planning a joint expedition to begin work in November at the mound Tell Billa, fifteen miles northeast of Mosul in Northeastern Mesopotamia. Ephraim A. Speiser, assistant professor of Semitics at the University of Pennsylvania, will head the expedition. The staff will include C. S. Fisher, S. N. Kramer, and A. H. Detweiler.

ALONZO W. POND, Mrs. Pond, and George L. Waite, returned to the United States July 3, after three months' work in the northern Sahara desert. The expedition (Beloit College-Logan expedition) uncovered about thirty skeletons, mostly fragmentary. Flint and bone implements and charcoal were also collected.

THE UNIVERSITY OF PENNSYLVANIA MUSEUM has been granted permission by the Guatemala government to excavate the ruins of Piedras Negras, a deserted city of the Mayas in northwestern Guatemala.

DR. FRANZ BOAS, professor of anthropology at Columbia University, has been elected an honorary member of the Wurzburg Geographical Society.

DR. KIMBALL YOUNG and Dr. Ralph Linton, formerly associate professors of sociology and social anthropology, respectively, at the University of Wisconsin, have been promoted to full professorships.

HARLAN I. SMITH of the National Museum of Canada, was awarded the honorary degree of master of arts at the University of Michigan commencement in June.

THE MUSEUM OF NEW MEXICO has adopted plans this year for the establishment of branches at Mexico City and San Diego, California.

C. WELLINGTON FURLONG has returned from Africa with ethnological records of pygmy tribes, relics of the Stanley and Livingstone expeditions, photographs, and motion pictures. His expedition visited Kenya, Tanganyika, Uganda, Sudan and the Belgian Congo, giving especial attention to the study of the pygmies of the Ituri forests.

HERBERT SPENCER DICKEY, who returned from an expedition to the headquarters of the Orinoco, plans another expedition to the same region in February. The expedition just returned, brought back ethnological material from the land of the Guaharibos Indians, geographical data, and collections of birds and mammals

made by Mrs. Dickey in the vicinity of the Casiguiari Canal. The Museum of the American Indian, Heye Foundation, is promoting the work.

ALES HRDLICKA of the Smithsonian Institution brought back from the Kuskokwim River region of Alaska, last summer, fifty cases of anthropological material. He discovered Eskimos living there that are believed to be almost identical with the ancestral type that came to Alaska from Siberia.

FOSSILS of *Sinanthropus*, the so-called "Peking Man," found near Peiping within the past year will provide the most valuable clue yet unearthed for solving the riddle of early man, was the prediction of Professor G. Elliot Smith, noted British anthropologist, in a recent lecture before the Chinese Geological Society. Professor Smith was in Peiping at the invitation of the Chinese Government for the purpose of studying the *Sinanthropus* specimens, including the skull of the Peking man found last year and a second skull recently discovered. Although the report on the cast of the brain case obtained from the second skull is not complete, Professor Smith described the discoveries as unique in the whole history of anthropology and predicted that the evidence would throw a flood of light on the nature of the primitive brain.

PORTIONS of a second skull of "Peking Man" have been found in material taken from the caves at Choukoutien. This second skull, though fragmentary, supplies data on certain parts not represented in the first skull. The announcement of the find was made by Dr. Davidson Black.

THE MYRON I. GRANGER expedition of the American Museum of Natural History, headed by Morton C. Kahn, has returned from Dutch and French Guiana. The party consisted of Dr. and Mrs. Kahn and J. Blake Eggen. They visited the Boni, Paramacca, and Aucaner tribes and brought back specimens of wood carving, religious objects, and other artifacts.

MATTHEW W. STIRLING of the Bureau of American Ethnology has reported finding this summer, in eastern Texas, caves bearing traces of human occupation in prehistoric times. Exploration of these caves may help explain how the Mound Builder culture found its way to the Mississippi valley from the Southwest.

AN EXPEDITION from the Museum of Northern Arizona, headed by Harold S. Colton, has discovered near Flagstaff, Basket-Maker and first stage Pueblo culture sites that bear evidence of having been buried under black volcanic ash from an eruption of Sunset Crater. A third site, second-stage Pueblo, near-by, shows no trace of the volcanic ash.

ON his return to Stockholm from China, in the spring of 1931, where he has been making explorations in Tibet and Mongolia, Dr. Sven Hedin will be presented with the first "Hedin Medal" by the Swedish Anthropological and Geographical Society.

TWELVE skeletons of the third Algonkian period have been uncovered by a Rochester Museum expedition under Arthur C. Parker at the Clark farm at Willow Point, near Binghamton, New York. During Dr. Parker's absence from the site to examine other sites in the county, skeletons uncovered by the expedition were disturbed and some bones stolen. This vandalism prevented the taking of photographs of the material in place.

THE CARLSBERG FOUNDATION of Science (Copenhagen) is sending an expedition under Harold Ingholt of the Carlsberg Glyptothek to excavate the old city mound at Hama in Syria where the first Hittite hieroglyphics were found. Dr. Ingholt will have the cooperation of Henry Seyrig, French director of antiquities.

DR. MAURICE G. SMITH of the University of Oklahoma, Norman, died on October 22, 1930, after a short siege of typhoid fever.

IN THE ABSENCE of Professor A. G. Keller, who is in Europe on sabbatical leave, Professor Maurice R. Davie is acting head of the department of anthropology and sociology at Yale. His recent book on The Evolution of War is being translated into French. Professor George Peter Murdock's Culture History, a critical translation of Julius Lippert's Kulturgeschichte, will be published soon by The Macmillan Company. This house will also publish, at a later date, a text he is preparing in ethnography, entitled *Our Primitive* Contemporaries. Professor James G. Leyburn is publishing through the Yale University Press a Handbook of Ethnography, which consists of a listing of some 12,000 tribes, clans and other social divisions, with their locations and other descriptive material and with accompanying maps.

AT THE INTERNATIONAL Congress of Popular Arts, held in Antwerp, August 28 to September 7, a paper by Miss Frances Densmore was read on "The Music of the American Indians at Public Gatherings." It was the only paper from the United States on the program. It was read by Miss Elizabeth Burchenal, President of the American Folk Dance Society (the United States section of the International Congress in Folk Arts sponsored by the League of Nations, and of which Miss Densmore is a member) and summarized in French by the official interpreter.

WARREN K. MOOREHEAD of Phillips Academy, Andover, Massachusetts, has announced the results of an archaeological expedition in the Merrimack valley, Massachusetts and New Hampshire. The expedition unearthed 110 Indian sites. Only three skeletons—none of which could be preserved—were found. Artifacts brought to light revealed that the art of the Merrimack Valley Indians was of a rather low order.

THE JOINT EXPEDITION of Peabody Museum of Cambridge, Massachusetts, and the University of Pennsylvania Museum to Central Europe, under the direction of Vladimir J. Fewkes, has made important finds at Harovice, Homolka, and Chrastany, near Prague. These include pottery, bronze ear-rings, bracelets, iron knives, and arrowheads belonging to a culture more than 5000 years old.

RONALD L. OLSON, assistant curator of South American Archaeology at the American Museum of Natural History, has returned from a seven months' excavating trip in Peru and Ecuador with important additions to the museum's collections. The expedition was financed by Myron I. Granger.

THE OTAGO UNIVERSITY Museum at Dunedin has a new two-story wing with 120 feet by 60 feet of floor space in each story. This wing will house the ethnographic collections.

PROFESSOR A. R. RADCLIFFE-BROWN, of the University of Sydney, Australia, will be in residence at the University of Chicago during the academic year beginning October, 1931.

DR. W. D. STRONG is leaving the University of Nebraska to take a position as Senior Ethnologist at the Bureau of American Ethnology, Washington, D. C.

DR. L. J. FRACHTENBERG died in the latter part of 1930.